RAILROAD GAZETTE

FRIDAY, FEBRUARY 7, 1896.

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Contributions.

Concerning the Serve Tube—A Correction.

In our last issue, page 70, appeared a table showing fire surface of plain and Serve's ribbed locomotive boiler tubes, together with other data. This was embodied in a letter from Mr. C. W. Whitney. Three serious errors in proof-reading occurred in that table, namely in the fourth and fifth columns. The table is here reprinted in full.

HEAT ABSORBING OR FIRE SURFACE OF PLAIN AND SERVE'S LOCOMOTIVE TUBES PER SQUARE FOOT OF TUBE SHEET.

Outside diameter and description of tubes.	Spaces between tubes.	Number of tubes per sq. ft. tube-sheet surface.	Area for passage of the gases per sq. ft. tube-sheet.	Heat-absorbing or fire surface per foot of length per sq. ft. of tube-sheet.	Percentage of increase in favor of Serve ribbed tubes.
2 in. plain....	5/8 in.	24.4	62.37	11.47	31.12%
2¾ " ribbed..	¾ "	11.75	50.42	15.04	
2 " plain....	5/8 "	24.4	62.37	11.47	22.2%
2¾ " ribbed..	⅞ "	10.96	47.	14.02	
2¼ " plain....	5/8 "	17.43	57.6	9.4	60%
2¾ " ribbed..	¾ "	11.75	50.42	15.04	
2¼ " plain....	¾ "	16.	53.024	8.64	62.2%
2¾ " ribbed..	⅞ "	10.96	47.	14.02	
2½ " plain....	5/8 "	14.75	60.38	8.8	70.9%
2¾ " ribbed..	¾ "	11.75	50.42	15.04	
2½ " plain....	¾ "	13.63	55.8	8.17	71.6%
2¾ " ribbed .	⅞ "	10.96	47.	14.02	

Greater Heating Surface in Locomotives.

PITTSBURGH, Pa., Feb. 3, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Mr. C. W. Whitney, in his communication in your issue of Jan 31, premises that unless means are discovered for increasing the "heating surface" of locomotive boilers, the engine, in its most advanced development, has about reached the limit of its capacity, and holds that the solution of the difficulty "would therefore seem to rest in the increased heating surface of the tubes," to attain which he recommends the employment of the Serve ribbed tube.

While I agree with Mr. Whitney, so far as he goes, as to the increase of capacity, in the direction and by the means which he suggests, I do not understand why he limits the possibility of increase to *tube* heating surface, and entirely ignores the advantage of that of *firebox* heating surface and grate area. Further, he is altogether in error as to its being virtually impossible to increase the grate area, by reason of "the driving wheels limiting the width," as there are between 1,100 and 1,200 locomotives in successful use in the United States today, in which the width of the firebox is not in the slightest degree limited by the driving wheels, and in which the grate area varies from about 60 to 89.5 sq. ft.

To increase tube heating surface is to do *well;* and to increase both tube and firebox heating surface is to do *better*. The wide firebox not only increases both grate area and heating surface, but also avoids the necessity of an excessively *long* grate. The latest engine of this type of which I have seen a report, has a firebox 9 ft. long by 7 ft. wide, and if it were shorter and wider it would still give grate area and firebox heating surface very much above those of the ordinary narrow firebox.

The latest practice in narrow firebox boilers shows an effort to crowd the boiler with tubes, without providing sufficient grate area, and without any corresponding increase of firebox heating surface. From this there results inordinately rapid combustion, back pressure from small exhaust nozzles, hard work for the fireman, and much coal drawn unconsumed through the tubes. These objections will be obviated when conservatism and force of habit yield, as they will have to do, to the inevitable, and the wide firebox becomes universal instead of exceptional. Coupled with the increase of tube-heating surface recommended by Mr. Whitney, there will then be a material increase of the capacity of the preseut most advanced development of general practice.

J. SNOWDEN BELL.

Water Tubes for Locomotives.

HARTFORD, Conn., Feb. 3, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Dec. 31, 1895, I notice an article by Mr. C. W. Whitney on "Increased Heating Surface of Locomotive Boilers," which is of interest, as is anything which deals with this problem intelligently. Now, Mr. Whitney states that he is doubtful of the expediency of a water tube firebox of a nature as proposed by Mr. Forsyth, as anything heretofore attempted in this direction has not proven successful. I have a strong conviction that the water tube application in the firebox, well planned and executed, will be of great benefit, and I have no knowledge of anything attempted in this direction, and hence would be under obligations to Mr. Whitney for a statement of where, when and in what manner such application has been made.

As Mr. Whitney concedes that an increase in area of heating surface is wanted, and that a material increase in size and length of present boilers is out of the question, it would seem that the solution of the question is this, namely, to increase the size of the combustion chamber, even at the expense of length of tubes, for the last few feet are not very effective anyway, and locate in this increased combustion chamber a properly designed system of water tubes, the heating surface of which, in that particular location, will be vastly more efficient than that of any other part of the boiler. It is my opinion that the capacity of a boiler of given size in this wise can be materially increased. I should like much to hear objections to the proposition.

JOHN CHRISTIANSEN.

Westinghouse Versus Boyden.

PITTSBURGH, Pa., Feb. 1, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The issue by the Boyden Brake Company of a circular dated Dec. 31, 1895, in which that company asserts, among other misleading statements, that the decision of the Fourth Circuit Court of Appeals in favor of that company is *final*, makes it necessary for us to state that the United States Supreme Court has, upon petition of our counsel, based upon a few of the serious errors involved in that decision, granted a writ of certiorari directing the case to be sent up to it for revision and final judgment.

The Boyden Company's statement was manifestly prepared before the Supreme Court granted the writ of certiorari, and it will thus be seen that that company is not yet finally authorized to make and sell quick-action air-brakes without liability for infringement of our patent rights.

We have never doubted that the final decision in this case will reaffirm the validity of our pioneer quick-action air-brake patent (No. 360,070, the one in dispute), as already established in other Courts; for Judge Hughes, in his decision in favor of the Boyden Brake Company says:

"That this invention of Westinghouse, thus undefinep (the Court then referring to the second claim), is one of the highest value to the public, and that it is a pioneer one in the art of quick-action brakes is not denied, and is conceded. It is conspicuously one of those pioneer inventions which entitle the proprietor to a liberal protection from the Courts in construing the claim."

This statement is in accord with the opinions of the other Courts which have, in each instance, conceded and affirmed the pioneership and value of this invention.

In each of the three previous decisions in favor of this patent, the second claim has been upheld and has not in any manner been held to be insufficient, even in any technical sense, to fully cover the invention, and we therefore the more strongly feel that our confidence in the ultimate determination of this litigation in our favor is well founded.

The Boyden Brake Company has issued an illustration and description of a new form of quick-action triple valve, which it states was subjected to a satisfactory rack test at Altoona, by the Air-Brake Committee of the Master Car Builders' Association. This new valve has not hitherto been the subject of litigation under our patents, and has never, to our knowledge, been commercially used or tested. We believe that the construction of this valve comes clearly within the claims of one of our patents, and we have promptly brought suit against the Boyden Company, to restrain that company from making and selling this new valve.

It will not be out of place to call attention to the fact that railroad companies have, in numerous instances, been misled by the statements of various parties manufacturing brakes, in infringement of our rights, and the loss inflicted upon those who have purchased brake apparatus in reliance upon those statements has already been very great. We feel convinced that we are fully justified in believing that our patents fully cover all of the forms of quick-action brakes which have so far been offered for sale, and that the Courts will finally so decide.

THE WESTINGHOUSE AIR BRAKE CO.,
H. H. WESTINGHOUSE,
General Manager.

Some Experience in Lighting Elevated Railroad Trains.

BROOKLYN, Jan. 30, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Noting the severe criticism of the lighting of the elevated railroad cars in New York City, and the act proposed to compel the use of gas or electricity, I recall an experience which may have a passing interest. In 1892 sixty new cars were built for the Brooklyn Elevated Railroad Co., in which it was determined to secure the best possible light from the use of kerosene oil. After considerable investigation and experimenting, a lamp was designed by the Messrs. Howard, of Hartford, Conn., expressly for these cars, and realized every expectation, in furnishing a soft efficient light, unaffected by the draughts and the minor accidents incident to elevated railroad service. Three lamps were used in each car, having the center draught burner, similar to the old student lamp. As more light was required more oil must be burned, and the fonts were made considerably larger than in the older lamps. The manufacturers gave close attention to the problem and made a neat and efficient lamp. The result is that these 60 cars, which have now been in use more than three years, have been continuously well lighted, so that the finest newspaper print can be read with ease in any portion of the cars. The lamps give two and one-half times as much light as the old lamps, which are the same as those now in use on the New York roads. It was estimated that the new lamps could be substituted for the old ones at about $50 for each car.

The makers have furnished the following data, based on careful experiment and photometric test:

	150 deg.	300 deg.
Oil burned in one hour, in gallons	0.0385	0.0384
Time in which one gal. would be burned in hours	25.9	26.0
Candle power of the light	35.6	37.6
Number of candles burning one hour to equal light from one gal. of oil	922.0	978.0
Cost of oil in cents per gal., taken at	7.0	13.0
Number of candles burning one hour to equal light obtained from $1 worth of oil.	13,200	7,520
Number of candles burning one hour to equal light obtained from $1 worth of illuminating gas (20 candle power at $1.40 per 1,000 cu. ft.)	28.600	

An expert in illuminants told me, after testing these lamps, that they gave the most light for the money of any that he had examined.

It seems quite radical to insist on the use of either gas or electricity at this time. Both are sometimes dangerous and always expensive; electricity is so expensive as to be impracticable unless it is also used as the motive power for the roads.

The most singular thing, perhaps, about our experiment is that while the 60 cars are run all the time, mixed up indiscriminately in trains with 230 cars lighted by the older lamps of much less power, no special effort has been made by the patrons of the road in favor of the new lamps, leaving the management to infer that, in the minds of its patrons, one light is just as good as another, if not a little better.

O. F. NICHOLS,
Late General Manager and Chief Engineer, Brooklyn Elevated Railroad.

Control of Railroad Building in New York.

TROY, N. Y., Feb. 3, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with much interest the excellent article on the "bicycle" railroad scheme in your last issue. The public is too apt to be deluded by such schemes of doubtful expediency, to say the least, and to regard competition, particularly in railroad service, as something to which it is entitled as a matter of right, even if it brings ruin to innocent investors and destruction to existing enterprises that have waited long and patiently for success.

I believe we are at a critical period in connection with the very existence of the restrictive railroad building laws, which the New York Railroad Commission seems to be trying to fairly and honestly uphold.

Section 59 of the New York Railroad Law (applicable to steam roads only) was passed in 1892. As Judge Herrick, of the New York Supreme Court, has said in an opinion, it changed the policy of the State in respect of railroad construction. It was a progressive and protective change. Under it, 21 of 41 corporations organized have been given certificates of public convenience and necessity. Twelve of these companies have either built or will do so in the spring; nine have done nothing, and in several instances are offering their franchises for sale, proving that the Board was too lenient. In one instance the hearing before the Board was very largely attended by interested property owners. All sorts of pledges of good faith were made, and assurance given that the stock would be promptly taken, and yet this is the most flagrant case of "hold up" in the list. I cite this simply to show how easy it is to be deceived. Seven applications were refused, and in all appeals to the courts the Board has been sustained. One is pending, and 22 corporations have made no application and have no legal existence as yet.

The section (59) was made applicable to street surface roads last winter. Since then 33 street roads have been incorporated; five have been granted certificates, one has been refused, four are pending, and 23 have made no

application. The one refused is the application of the Buffalo Traction Co. It is the first under the amended law, and is therefore of more than ordinary importance as establishing a policy for the future. It is this case that may pull the law down. Buffalo is divided in sentiment, the business and conservative elements sustaining the Board. The alluring prospect of a division of $3,000,000 of stock of a corporation whose construction could be provided for out of the bonds under our elastic laws, no doubt captured some worthy citizens of Buffalo by whom "public convenience and necessity" was regarded as a particularly pleasing "private snap."

The amendment to Section 59, making it applicable to street roads, was, I believe, not suggested by the Board. There can be no doubt that it was wise legislation, but incomplete. The conditions as between street and steam roads are so different as to require some modification in the law. In its last report the Board recommends, if the section is to remain as at present, that the Commissioners should have the power to approve of the whole or a part of a street railroad application, and not be required as now to reject or approve of the road "as proposed in the articles of association"; also that extensions should be brought within the provisions of Section 59. This is provided for by the Brackett bill now pending in the Legislature. As the law now stands a street surface road could seemingly be constructed from New York to Buffalo without supervision of the Railroad Commissioners.

Since the organization of the first railroad in this state there have been in round numbers 1,800 railroad companies of various kinds organized and chartered. Of these, 171 steam roads survive, five elevated roads, 67 electric and 31 horse roads. The 171 steam roads are operated by 80 active corporations; the others leased. The roads of this state have practically emerged from the receivership and reorganization period and are likely to stay out, if given only a portion of the state protection to which they are entitled. The people of this state have lost millions of dollars in schemes and profitless enterprises and should now be protected from themselves their own greed and their errors in judgment.

X. Y.

Some Railroad Matters in England.

Light Railroads.—Foreign railway officers who were present at the meeting of the International Railway Congress in London last summer will perhaps remember that the question which beyond all others roused the interest of the English delegates, was the question of secondary, or as we have agreed to call them here, light railways. Mr. Bryce, at that time President of the Board of Trade, himself took part in the discussion of one of the papers in the Light Railway Section, and appealed to the non-English delegates present for guidance on a question on which confessedly England is far behind every other country. Since then, though nothing has been actually done, the matter has been constantly before the public in one way or another. The Light Railway Bill, introduced into Parliament by the late Government, failed to pass owing to the dissolution, but it gave rise to an interesting—it cannot be said to a well-informed—debate in the House of Commons.

The new Government are practically pledged to introduce a bill of their own next session, and from words which certain ministers have let fall it seems not impossible that this bill may contain provisions introducing for the first time into England the continental principle of State aid to railway enterprise. That this policy would be popular with country and more especially agricultural constituencies is clear, and in fact an influential association was formed the other day to promote it. On the other hand there will unquestionably be strong opposition to any such new departure. Mr. Hopwood, the secretary of the railway department of the Board of Trade, has recently been to Ireland to study on the spot the working of the guarantee system in that country, and he is hardly likely to have been able to report over favorably of it. Mr. Ritchie also, the new President of the Board, has been to Belgium and seen something of the working of the Chemins de Fer Vicinaux. Presumably he has learned that the Societe, though organized as a private company, so far from being an independent company subsidized by the state, as people believe here, is for all practical purposes a state organization pure and simple. Presumably he has heard also that competition exists even between the two state organizations of the Vicinaux and the Chemins de Fer de l'Etat Belge, and consequently he has been able to appreciate how serious this question of state aided competition with private enterprise might become in a country which, like England, is covered already in every direction with independent private lines. It is true that a part at least of the difficulty here suggested might be obviated if the state subsidies were given to existing companies toward an extension of their systems in agricultural districts. But such a policy would be very far from being popular, and it is questionable whether any ministry would venture to propose it. However, all doubts as to what the Light Railway Bill of the Government will contain are likely to be set at rest at an early period of next session.

Rates on Farm Products.—Meanwhile the great railway companies themselves have become alive to the necessity of doing something to alleviate, if possible, the ever deepening agricultural depression. The Great Eastern, a company which not only serves the most purely agricultural, and therefore most depressed district in England, but also has in the course of 20 years worked its way from the very lowest to perhaps the highest place in public esteem, was the first to move. At the beginning of December it introduced a new uniform tariff from the larger part of its district to London for farm produce in small consignments by passenger train. The rates which in every case include free delivery to the consumer in London—it may be at a distance of six or eight miles from the company's terminus—are as follows:

Under 20 lbs.	4d.
Over 20 and under 25 lbs.	5d.
" 25 " " 30 "	6d.

and so on up to a maximum of 60 lbs. for which the charge is one shilling. Packages above 60 lbs. are excluded from the tariff altogether. These rates are all at owner's risk. Further the company stipulates that the carriage must in all cases be prepaid, and that the packages shall be boxes of a specified shape and size, fastened by nails and not by rope or cord. In order to prevent difficulty on this score the company itself has started box manufacturing and has boxes on sale at all stations at a price far below what the farmer could buy them at elsewhere. The 20-lb. size, for instance, costs 1½d., the 35-lb. size 3d., and the 60-lb size 5d. The company hopes in this way not only to get good loading for its vans but also to get rid of the constant difficulties attending the carriage of "returned empties."

There are two points of special interest in connection with this tariff. In the first place it is extraordinarily low, so low that from stations distant, as many of those concerned are, 80 or 100 miles from London, it will probably in the future be cheaper to send farm produce in boxes by passenger train than by goods train at the ordinary tonnage rate; so low, moreover, that if the ordinary calculation be correct, which says it costs 3d on the average to deliver a parcel in London, one can hardly see how it is to be otherwise than a dead loss to the company. Secondly, it only applies at stations where the Great Eastern Company is alone, and is not extended to places served also by a competing railway. For the full success of this new departure two things seem to be still necessary in the farmers's interest—an organization to bring the farmer into relation with the London consumer; and secondly, machinery for the collection of the price of the box from the customer and its payment to the consignor. A National Agricultural Association that has recently been formed with very influential support is understood to have these two matters in hand at the present moment.

Another great railway company which stands high in public esteem, the London & Southwestern, has announced that with the beginning of the new year it will reduce its rates for fruit and vegetables in lots of 1 cwt. by an average of 25 to 30 per cent.: simultaneously it will put in force lower rates for the carriage of grain, oil-cake, packed manures and hay and straw into London from stations distant more than 40 miles. But the South Western, like the Great Eastern, confines its reduction to "non-competitive" stations, a restriction which will, one cannot but think, puzzle not a little the average Englishman who still firmly believes that competition is the surest method of obtaining a reduction of rates.

A third and still greater company, the London & North Western, has promised considerable concessions to the farmers in Cheshire and North Wales who supply the great Lancashire towns. Lastly the President of the Board of Trade has invited the chairman of the nine great companies entering London to meet him at an informal conference on Jan. 30, and consider the situation as a whole. Whether liberal concessions are more likely to be obtained by a minister insisting on the solidarity of the companies or through direct negotiation of individual districts and trades with the company that actually serves them, is, however, a point on which it is quite possible different opinions may be held.

A "Reasonable Rates" Decision.—A very important decision has been recently given by the Railway Commission. An Act of Parliament passed in 1894 in effect provides that, if any trader objects, no railway rate may be increased unless the company can satisfy the Commission that such increase is "reasonable." The Midland Railway, having increased the coal rates to London by an amount equal to about 3½d. per ton, three firms of coal owners and coal merchants objected. The Midland justified its action on the ground that the working expenses of coal traffic had increased since the rate was last fixed by 7.41 per cent. The presiding judge accepted the evidence as justifying the entire increase; the two lay members of the Court considered that a part only was justified, and in the end judgment was given sanctioning an increase of 2d.

The interest of the case, however, turns on the test of "reasonableness" adopted. Apparently the only justification which will satisfy the court is an equivalent increase of working expenses. How this, however, is to be ascertained is not so clear. "Percentage of working expenses," thinks the judge; "expenses per train mile," says Sir Frederick Peel; but then, adds Lord Cobham, it must be "expenses connected with the particular traffic in question, and not the coal traffic of a great company as a whole." Under the circumstances the judicial standard of reasonableness seems somewhat indefinite. This much, however, seems already both obvious and important. To ascertain even approximately the cost of carriage of certain traffic over a long period is a very difficult and expensive task. For anyone except a defendant railway company it is so difficult and so expensive as to be practically impossible. On the whole, in the very rare instances in which a railway company desires to increase rates it is not likely to be deterred by the risk of an adverse decision of the Railway Commissioners.

New Enterprises.—The Parliamentary schemes for next session have now been published. Two new railway projects are of more than local interest. Alone among English companies the North Eastern has, like a French company, exclusive possession of a large district. There is, however, in its district one Naboth's vineyard. The Hull & Barnsley Railway Company possesses a line from the great West Riding coalfield to Hull, where it also owns a large, modern, deep-water dock. Two years ago the North Eastern was permitted by Parliament, after a keen fight, to acquire possession of all the other docks at Hull. Now it applies for permission to buy up also the Hull & Barnsley Railway with its attached dock. The Hull & Barnsley shareholders, who once got a dividend of one-half per cent. some years ago, but have had nothing since, would be only too glad to sell. But the municipal corporation of Hull, who were permitted by Parliament to become shareholders in the Hull & Barnsley to the extent of £100,000—the only instance of the kind in this country—have a statutory right of veto on the sale. Apparently they propose to exercise it. The probability is that the bill will be withdrawn altogether.

The second important scheme is for a new South Wales Railway from Cardiff to London, with a great bridge over the Severn near Chapstow, some eight miles higher up than the existing Severn Tunnel. The new line is promoted by a combination of several of the existing small but very rich coal-carrying companies who desire to make themselves independent of the Great Western Railway, which at present owns the only access both to London and the great steam coal using ports of Southampton and Portsmouth. Of course the Great Western will fight to the death against the project, and it has already put forward as a competing proposal plans for new lines shortening and improving its existing route to South Wales. In one way or another half the great railway companies in the country are affected by the new scheme, so we are likely to see one of the longest and most stubborn Parliamentary contests which the present generation has known.

The rapid development of Southampton as a port has been watched with fierce jealousy by its ancient rival Plymouth, and recently the Hamburg-American line has been induced to try Plymouth instead of Southampton as the English port of call for its splendid vessels on the homeward journey. Evidently everything possible will be done by the Great Western Railway to make the experiment a success. The distance from Plymouth to London by this company's route is 246¾ miles, the first 40 of which are over the worst gradients of any main line in the country. On the first occasion the special train with mails, passengers and specie covered the distance in 278 minutes. A second run on Dec. 20 brought the time down to 237 minutes, precisely 194 minutes being occupied for the last 194 miles of the journey between Exeter and London.

The Great Northern's Superintendent.—The following paragraph which appears in the *Times* will be read with regret by Mr. Cockshott's numerous friends in both hemispheres.

"With the close of the year 1893 Mr. Francis P. Cockshott, the veteran Superintendent of the Great Northern Railway, retires into private life after 55 years of active service, carrying with him the affectionate regard of the entire railway world and the gratitude of millions who, though they may never have heard his name, have yet appreciated the excellence of the Great Northern services to Lancashire, Yorkshire and Scotland. Mr. Cockshott's life may be said to be an epitome of English railway history. As a schoolboy he often rode on the foot-plate of 'No. 1' of the Stockton & Darlington. He was on board the first ship that ever entered Middlesbrough Docks. While yet in his teens he became private Secretary to Mr. Edward Pease, M. P.; Treasurer of the Stockton & Darlington and Great North of England railways, and in that capacity often attended meetings between Joseph Pease and George Stephenson. From Darlington, after a short training in the engineering shops at Shildon, he went to Scotland as Goods Manager and Superintendent of the Edinburgh & Northern, afterward known as the Edinburgh, Perth & Dundee, whose trains from Leith were hauled up by a stationary engine through the Scotland Street Tunnel—now abandoned to mushroom growing—into the then new Waverley station in Edinburgh. Leaving this company, whose financial position made it questionable whether the officers' salaries were certain to be paid, in 1851, he went to the South Devon, where the atmospheric system had only recently been abandoned. In 1858 he took charge of the Cornwall railway also. There it was his lot to conduct Brunel, lying on his back on a carriage truck, to see for the first and last time his great Saltash bridge completed. There, too, the intervention of a director, who urged him not to work himself to death, dragged him from the foot-plate of an engine which half an hour later ran off the line on a viaduct near St. Germans and buried itself and its crew in the mud of the Tamar. In 1865 Mr. Cockshott came to King's Cross to take up the position which he still holds. He found the best trains, reserved, of course, for first and second-class passengers, taking 10½, 11½ and 16 hours to Edinburgh, Glasgow and Aberdeen respectively. To-day third-class trains run in 7½, 8 and 10½ hours respectively. In the unceasing contest between the rival routes, which has worked out this beneficent revolution, no man has played a more active and honorable part than Francis P. Cockshott."

London, Dec. 31, 1895. W. M. Acworth.

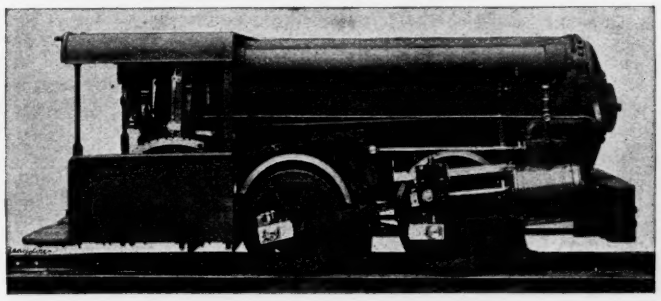
Porter Compressed Air Locomotive for Mines.

Messrs. H. K. Porter & Co., of Pittsburgh, Pa., have recently shipped to the coal mines at Vivian, W. Va., some compressed air locomotives, three views of one of which are shown in the illustrations. This company has lately made two similar locomotives for the New Orleans & Western Railroad for use in the cotton sheds, where there would be danger of fire from the sparks of a steam

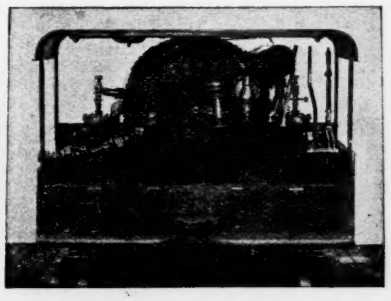
locomotive, and one for the Susquehanna Coal Company for use in the shafts. This latter we described in our issue of Aug. 9. The new locomotives are approximately 10 ft. 5⅛ in. long, 5 ft. 8 in. wide and 4 ft. 5 in. high and weigh 10,000 lbs. It will be seen from these figures and from the cuts that they are adapted for running in very small openings. The cylinders are 5 in. × 10 in., and the driving wheels, of which there are four, are 23 in. in diameter. The storage tank has a capacity of 47 cu. ft. of air and a working pressure of 535 lbs. per square inch, and there is also an auxiliary reservoir. The locomotive main tank is designed for 600 lbs., but the working pressure for the service intended is about 535 lbs. A three stage compressor is used, pumping into a 3-in. pipe line, which serves to connect the compressor to the most convenient point of charging the motors, and also acts as an air reservoir, the compressor and pipe line being competent to withstand a pressure of 850 lbs.

These locomotives, which take the place of mules, are to be used in side entries and in making up trains in the rooms of the mine and delivering the trains to the main entry where they are handled by steam locomotives. The average length of each side entry is 4.500 ft., with grades of 1¾ per cent. in favor of the loaded cars. The gage of the track is 3 ft. 8 in., the weight of the rails 16 lbs. per yard and the radius of the sharpest curve 24 ft. The locomotives are designed to make the round trip of 9,000 ft. with six cars with one charge of air and to work on curves of 15 ft. radius. The weight of the loaded cars is about 8,500 lbs.

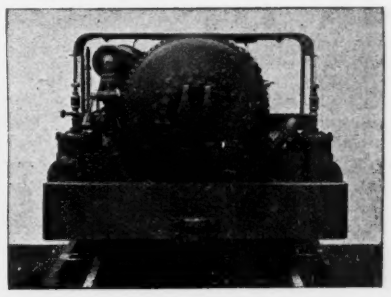
This is said to be the first introduction of any kind of mechanical haulage anywhere for sole use in butt entries and rooms. The low cost of installation and operation and the greater adaptation to the conditions of service and requirements caused the pneumatic system of haulage to be adopted in preference to electric haulage, although an electric plant had already been determined upon for working the mining machines.



Side View—Porter Compressed Air Locomotive



Rear View - Porter Locomotive.



Front View—Porter Locomotive.

The Present Aspects of the Mississippi River Improvement.

BY J. B. JOHNSON, M. AM. SOC. C. E.*

The bill now before Congress authorizing Messrs. Samuels and Mason to maintain a navigable channel in the Mississippi River, at low water, from St. Louis to the mouth of the river, of 7 ft. in depth below Cairo and of 6 ft. in depth between Cairo and St. Louis, this work to be independent of the work now in progress under the Mississippi River Commission, is a matter of no small importance. The support of a movement of this character would seem to involve some want of confidence in the methods employed by the Commission, at least so far as any early results are concerned. The passage of this bill possibly may carry with it the entire abandonment of the Commission and its work.

The Mississippi River Commission has now been in existence 17 years. It is composed of two civil engineers, one lawyer, one representative of the U. S. Coast and Geodetic Survey, and three officers of the Corps of Engineers of the Army, one of the latter of whom is President of the Commission The secretary of the Commission, who is its executive officer, is an officer of engineers of the army, and the officers in direct charge of the improvements are also members of that Corps. The Commission also makes its report through the Chief of Engineers of the army, so that its work has represented almost exclusively the policy and method of members of the U. S. Engineer Corps Not until Col. Henry Flad became a member of the Commission in 1889 did any civil engineer exert any marked influence upon the policy or work of the Commission. The appointment of this famous engineer to a membership on the Commission marked a new epoch in its history.

The work of the commission hitherto has been of three classes; building levees, the protection of banks, and the construction of channel contraction works, intended to narrow the channel in the wide places to a width of about 3,000 ft. The effect of building levees upon the tops of the banks on the improvement of low-water navigation has by some engineers always been regarded as detrimental rather than helpful, but at best the influence of levees on the improvement of the channel at low stages is extremely indirect, and could only become appreciable after long periods of time, some of the claims of the Commission to the contrary notwithstanding. The protection of the banks is necessary to the maintenance of the efficiency of the contraction works constructed in the channel, so that these two parts of the general scheme of improvement are mutually self-supporting and necessary to each other.

The effect of the contraction works as designed by the Commission on the depth of the low-water channel, when such improvements have been completely carried out, if they ever should be, at a probable expense of from one to two hundred million dollars can only be estimated. A careful estimate made in the editorial columns of the *Railroad Gazette* April 22, 29, and March 6, 1887, was that by these means no greater navigable depths, at all stages, could be secured than 12 ft. up to Vicksburg, 10 ft. to Cairo, 8 ft. to St Louis, 5 ft. to Keokuk and 3 ft. to St. Paul. These prospective depths have by no means been reached as yet at any of these points in the river at the lower stages, and it is not at all likely that they ever would be exceeded by the methods hitherto employed by the Commission.

At this time there have been spent under the direction of the Mississippi River Commission about twenty-three million dollars, eight million of which have been devoted to building levees. At first Congress refused to appropriate money for building levees unless the Commission would put itself on record to the effect that such levees were absolutely essential to the improvement of low water navigation. After the Commission had done this repeatedly, appropriations were made by Congress, with the understanding that building levees was an essential part of river improvement. Of course there has always been a very strong pressure brought to bear both on Congress and on the Commission to devote money to building levees in the interest of the protection from overflow of the bottom lands bordering the Mississippi River below Cairo. Doubtless, it will ultimately appear that the cause of river improvement in the interest of navigation has greatly suffered by this great divergence of funds in the interest of the protection of swamp lands from overflow.

One indication of the failing confidence on the part of the public in the methods of the Commission is the introduction of this bill into Congress, authorizing Messrs. Samuels and Mason, of St. Louis, to proceed to obtain a low-water navigable channel in the river, independent of the work of the Commission. This bill has received the support of nearly all the commercial organizations in St. Louis, and is receiving hearty support from river men, and from other cities along the river. It is claimed that the methods of the Mississippi River Commission are too slow in obtaining results, and that before the river can be improved as they propose, the river traffic will have become practically extinct. Why they could not have foreseen this before, and have exerted themselves to counteract the influence of the levee interests in favor of channel improvement proper, instead of endorsing absolutely the policy of the Commission in the building of levees, does not appear. They seem, however, at last to have realized the situation.

The Mississippi River Commission itself seems to have at last awakened to the necessity of obtaining a navigable channel within the life of the present generation, and Col. Henry Flad has shown them how this can be accomplished. Several years ago the Commission consented to allow him to build an experimental dredge boat, which should be used at the lower stages of the river, to cut an incipient channel through or across a sand bar which had been built up by the preceding high water; this channel to be so located as to rapidly enlarge by the flow of the current through it, and thus become a navigable channel across the bar for the rest of that low-water season.* If a dredge boat could be designed with a large capacity, delivering the excavated material entirely beyond the channel itself, and to be operated by moving rapidly up stream across the bar, cutting a channel as it went, it was thought one such boat would be able to maintain navigable channels across all the sand bars which would develop in a considerable length of river, and that a sufficient number of such boats (the Commission estimate that nine would be required), could maintain a good navigable channel throughout the entire length of river, below St. Louis. These channels would, of course, be only temporary, as they would all be obliterated during the following high-water season, and the work would have to be done over again every succeeding year. This kind of an alternative the Commission were slow to accept, and they did not give to Colonel Flad that hearty support in the preparation of his experimental dredge which a man of his experience and reputation had reason to expect. In fact the responsibility of this undertaking was thrown entirely and solely upon him, the Chairman of the Committee under whom he operated not even consenting to examine his drawings at any time, either before or after the letting of the contract for this novel and remarkable machine. For two years Colonel Flad gave his entire time to the preparation of the plans and the construction of such a suction dredge, the only assistant allowed him being a mere draftsman, with no engineering ability (Colonel Flad is now seventy-two years old). This work, however, has proved to be perhaps the greatest triumph of a long and successful career.

This dredge, called the Alpha, intended only as a working example to prove the practicability of the Colonel's ideas, has been a remarkable success. While it was not intended as a working dredge for the improvement of the river, it has kept a good navigable channel across four of the worst bars in the river below Cairo, throughout the entire low-water season of 1895, which was the worst on record. It is able to excavate six hundred cubic yards of sand per hour, and deliver it through a thirty-six-inch pipe at a distance of 1,000 feet. It has worked as much as 120 hours continuously without stopping, has been in operation 70 per cent. of the time (day and night) during three or four months of low water in 1895, with no breakage or interruption worth mentioning. So very successful has been this experimental dredge in its capacity for excavation, and also so successful have been the experimental channels excavated by it, all of them having greatly enlarged and deepened by natural processes, that the Mississippi River Commission have adopted this method of temporarily improving the channel, while they intend also to carry on their more permanent improvement. They have already devoted $700,000 to this experimental work and to the building of new dredges, one of which is now practically completed, and is intended to have a capacity of 1,600 cu. yds. per hour, while the contract for another, having a capacity of 800 cu. yds. per hour, is about to be let.

The success which has attended the work of Colonel Flad's first or experimental dredge has pointed the way to a practical improvement of the low-water channel, and it is doubtless the success attending this experiment which has led to the Samuels-Mason bill now before Congress. While, therefore, this bill seems to antagonize the work of the Mississippi River Commission, the methods they would employ are doubtless the same which that Commission has now shown to be practicable and the methods also which they themselves propose to adopt. If this method, therefore, should fulfil its present promises, either under the auspices of the Commission or under those of the private company, the professional credit for such success belongs solely to Col. Henry Flad, who was forced to assume the entire professional responsibility of the undertaking.

The question now before Congress is whether or not it is advisable to leave the work of improving the river to the Commission, or to let a separate contract to a private company, as proposed in the Samuels-Mason bill. Since the scheme of annually dredging a provisional channel across sand bars, to be further enlarged by the current, has only during the past season been proved practical and efficient, the Mississippi River Commission are as able as a private company to employ this system to advantage, and to secure from it all the results it is capable of giving. In fact, it has already become their policy to build these boats and operate them, to the full extent of their present appropriations. If Congress would give to the Commission, therefore, the money which it is now proposed to give in this bill to private individuals, it would seem that the Commission should secure from it all the advantages which could come from its expenditure through any other channel.

The past record of the Commission, however, does not stand them in very good stead at this juncture. They have always been more or less divided in their views as to the proper expedients to employ, and whether or not they would now operate the new method so vigorously on the entire length of river below St. Louis as to give a clear channel over this whole distance may well be questioned. The necessity to do just this at the risk of losing everything is, of course, the strong feature of the Samuels-Mason bill.

There is no question but the work agreed upon to be

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* It does not seem to be generally known that the bars are all built up during the high-water season, and the greater the flood-volume the greater the damage to the low-water channel.

done by Messrs. Samuels and Mason is well worth the money to be paid them under the terms of this bill, and if we are to judge of the future by the past we may well conclude that some such private contract offers a greater assurance of success than to continue to rely on the work of the Commission. In going into such a contract with private individuals, however, Congress should call to its aid the best engineering advice and make the terms of the bill such as to insure a successful compliance and to provide against the company obtaining their annual stipend without having fully earned it.

The Mississippi River Commission might also be continued in this case and it might be made a part of their business to determine the matter of compliance on the part of the company. This is the most difficult part of the Congressional problem. Whether or not it is practicable to provide a sufficiently large surveying force, through the low water season only, to fully determine the work of the company over the 900 miles of river from St. Louis to Vicksburg is a serious question. We have had, it is true, too much "Congressional engineering," but if Congress will call to its aid the proper professional assistance it doubtless could enter upon such a contract as is proposed with security. There are strong arguments on both sides of the question and it is to be hoped no hasty action will be taken.

The New Draw Bridge Over Frankford Creek, Philadelphia.

[WITH AN INSET.]

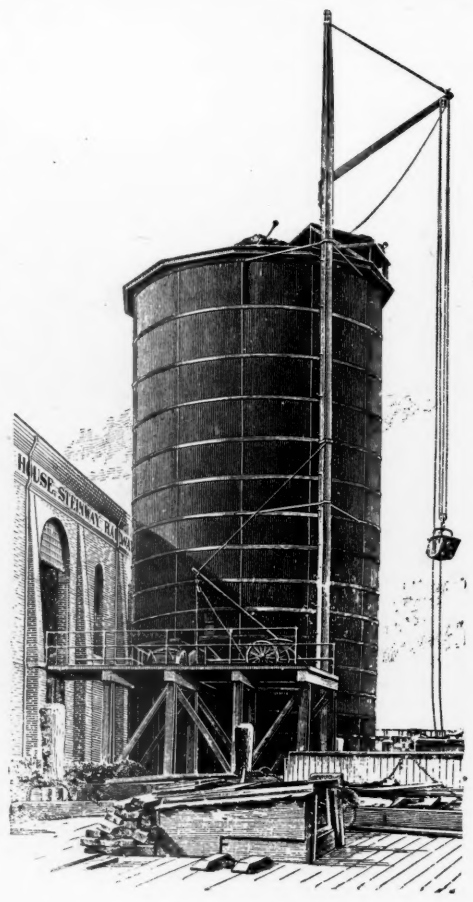
The contract for a new draw bridge and one fixed span on the line of Bridge street over Frankford Creek, Philadelphia, which involves some unusual features, has recently been awarded to the firm of J. H. Hathaway & Co., of Philadelphia. The contractors have begun preliminary preperations, but they will not receive formal notice to begin work till the spring, in order that there may be no danger of the work being interrupted by freezing. The work must be completed within six months of the date of notice by the Chief Engineer to commence work, under a penalty of $10 per day for each day occupied beyond that time.

Frankford Creek being a navigable stream, the approval of the War Department had to be obtained for all the plans for the replacement of the present bridge. The traffic over and through the existing draw is so great that provision will have to be made for it by the temporary re-erection of the old draw near its present location. The old bridge will be re-set upon temporary pile foundations and approaches will have to be made through private grounds on one side and through the grounds of the U. S. Arsenal on the other. This will require the temporary removal of a section (56 feet long) of the high stone wall bounding the Arsenal grounds and the erection of a 12-foot tight board fence from the wall to the creek, cutting off the rest of the grounds from the part used as a temporary approach. The temporary approaches are to be restored to their original condition, the Arsenal wall rebuilt, the temporary bridge with its pile piers entirely removed, and a specific rental paid to the owner of the private property on the south side, which is used as a temporary approach. Existing gas and water mains under the creek, which are to be removed and relaid, further complicate the work. In order to accommodate navigation, the old pier at the south end of the present fixed span must be removed before the coffer dam for the first pier is put in place, and after the construction of the first pier the coffer dam used for it must be removed before the other new pier is commenced. Dredging must be done to make the channel through the temporary draw equal to the present draw channel in width and depth. In short there must be no obstruction to existing navigation. Provision must be made to transfer foot passengers by ferriage while the old bridge is being transferred to its temporary position. All these necessary specifications and complications combine to make the cost of the work far above what it would otherwise be.

The bridge piers are to be placed on pile foundations, the timber platforms capping the piles to be about 8½ ft. below Mean Low Water. Before laying the platforms the loose material between and around the piles is to be removed to hard bottom, and then the space is to be filled in with cement concrete to the top surface of the cap timbers. On this platform will be placed a foundation of cement concrete 7 ft. thick. The masonry for the piers is to be of regular coursed rock-faced ashlar, alternate header and stretcher work, backed with cement concrete. The masonry for the abutments will be large horizontal rubble. The mortar is to be made of one part of Portland cement and two parts of sand. The concrete is to be made of one part of Portland cement, two parts of sand and five parts of broken stone.

The operating machinery for turning, counterpoising, wedging and locking are according to the designs of Chas. M. Mills, M. Am. Soc. C. E., formerly of Phœnixville and now Assistant Engineer in the Department of Public Works, of Philadelphia. On account of the unequal arms of the draw span, and also on account of the eccentric position of the street railroad track, with the framing for trolley wires, and also the eccentric position of the operating machinery, extensive counterpoising is necessary. In wet weather the wooden flooring of the bridge will absorb such a volume of water that its added moment on the long arm will be very large and provision for it will be made by counterpoises which can be shifted. There will be four counterpoise "carriages," moving on rollers, each operated by an 8-in. pinion (No. 15, the engraving showing the detail of the operating machinery) engaging a rack which forms a tongue to each carriage. The 8-in. pinions are mounted on a 2⅞-in shaft, transverse to the line of the bridge. Beveled gears (16 and 17) transmit motion from a longitudinal shaft, which is in turn operated through other bevel gears (18 and 19) by a short vertical shaft, worked by means of a key, through a trap door in the bridge floor. The carriages will each hold several tons of cast-iron blocks and have a range of motion of seven feet. The carriages will be placed in four of the compartments between the stringers in the short arm. Fixed counterpoises will also be used by filling the compartments between the floor stringers at the extreme end of the short arm with cast-iron blocks. The total amount of counterpoise required is not directly specified as it will depend somewhat on the precise weight of the steel sections used and other possible variations, especially as these differences will be multiplied by the greater leverage of the long arm. It has been estimated that it will require about 85 tons of counterpoise. The contractor is required to balance the bridge when everything is in place and the carriages are all in their "neutral" or middle position.

The draw span is to be operated by a 10 H. P. electric motor, the current for which is to be furnished free by the electric street railroad which is to use the bridge. "The motor shall have such capacity as to deliver 10 H. P. at the pitch line of the rack-circle, the speed of the driving pinion being 11.8 revolutions per minute and, by the intermediate gearing, making the speed of the primary shafts of the motor about 700 revolutions per minute. The motor is to be series wound, equipped with a controller similar to those in use on the street railroad cars, is to be water and dust proof, and mounted on not less than 5 in. of hard wood, as an insulation from the steel superstructure. The attachment to the structure shall be made on the westerly side of the westerly main girder, in the position shown in the inset, being placed as near to the girder as possible to reduce encroachment in sidewalk. By means of friction discs and the lever *T*, the motor can be made to withdraw the wedges of which there are four; one on each side of the pivot and one under each main girder at the end of the long arm. The friction discs are on a 2½-in. shaft transverse to the bridge. By means of bevelled gears (9 and 10) the motion is transmitted to a 2½-in. shaft lying in the center axis of the bridge. A 7-in. worm on the end of this shaft operates a gear which turns a 2⅜-in. shaft running to each main girder. Two cranks are set each side of each main girder, which operate forked connecting-rods, which in turn operate the wedges. Two worms on the main shaft each operate a smaller longitudinal shaft which operates by a crank one of the side wedges. By setting the lever *T* to engage the clutch *K* the bevelled gears (5 and 6) will operate the 3½-in. longitudinal shaft, which by means of the bevelled gears (7 and 8) will operate the vertical shaft to which is attached the pinion (13 teeth, 3-in. pitch) which runs in the rack on the pivot pier.



A Cylindrical Steel Coal Pocket.

The lever *U* located near the center of the bridge operates the locking latch which is placed at the center of the end of the long arm.

When it is desired or necessary to operate the bridge by hand, it may be done by turning the lever *V* which disconnects the coupler *P*, thus loosening the gear 7 from its shaft. A hand lever working through an opening in the bridge floor will operate the main longitudinal shaft through beveled gears (11 and 12) and will thus operate the wedges. A hand lever, working similarly through the floor by means of the beveled gears (13 14 and 7*a*), will operate the large bevel gear 8 and turn the bridge.

The pivot will be provided with a "lens" of phosphor bronze, 13$\frac{7}{16}$ in. in diameter, set between two carefully polished plates of cast steel. This bearing will be very carefully protected by a copper apron ⅛ in. thick from the introduction of grit during a possible submergence by extreme floods. There are no conical rollers. While swinging, the whole weight of the draw will be carried on this pivot except when there is a tendency to eccentricity, when rollers will take the weight on a rail, having a radius of 12 ft. 6 in., laid near the edge of the pivot pier.

A Cylindrical Steel Coal Pocket.

The engraving shows a novel pocket for storing coal, recently erected by the Berlin Iron Bridge Co. for the power house of the Steinway Electric Railway Company at Astoria. This unique form was designed to secure the maximum of storage capacity with the minimum of ground space. The design is patented by the Berlin Iron Bridge Co.

This particular pocket is 28 ft. diameter, 54 ft. high and has a capacity of 1,000 tons of coal. The coal is hoisted to the top of the pocket by a bucket, worked with an ordinary hoisting engine. Of course a more expensive mechanical apparatus could be used, but in this case such additional outlay for hoisting plant was not warranted. In the side of the pocket near the base is an opening, through which the coal is discharged, and any of the usual means of conveying the coal to the boiler house can be applied. It is not claimed that there is any gain in facilities for handling the coal, but that it is an economical method of storing, and especially that it takes up less room proportionately to the storage capacity than any other device.

Balanced Slide Valves.

At the December meeting of the New York Railroad Club a discussion on the subject of balanced valves was opened by Mr. L. R. Pomeroy. He gave a brief review of the history of the balanced valve, the first application of which to a locomotive was by John Gray, about 1838, on the Liverpool & Manchester Railway. In 1844 a form of balance was in use on the Grand Junction, now part of the London & North Western, an engraving of which is shown in Mr. Pomeroy's paper. The paper reviews some of the experiments to show the effect of balancing of the valves. Experiments made by Mr. W. G. Beattie, about 1871, are quoted to show the power required to move unbalanced valves. With a steam chest pressure of 125 lbs. per square inch he found a force of over 6,000 lbs. on the valve stem required to start the valve. To keep the valve in motion he found 4,600 lbs. on the valve stem necessary.

The experiments of Professor Robinson, published in the Proceedings of the American Society of Mechanical Engineers in 1883, investigating the question of effective area to be balanced are quoted. Tests made by Mr. Philip Wallis in 1886, while Engineer of Tests on the Chicago, Burlington & Quincy, are also cited. Mr. Wallis concluded that 6 H. P. is required to work unbalanced valves at 40 miles an hour, while for balanced valves 2.2 H. P. only would be necessary. The unbalanced valves had a surface of 164 sq. in. exposed to steam pressure. The balanced valves had an unbalanced surface of 9.6 sq. in. It is claimed that as in Mr. Wallis' tests only 40 per cent. of the area was balanced, whereas 60 per cent. has been successfully balanced, better results could have been got if Mr. Wallis had balanced his valves up nearer to the limit. Mr. Pomeroy's deduction from his inquiries is that the balanced valve offers but 36½ per cent. of the resistance offered by the unbalanced valve for the same boiler pressure.

He shows a number of examples of balanced valves that have appeared and then disappeared, until finally the Richardson and the American are the best known types that endure.

One is led to conclude that any form of balance that consists of a solid frame is not satisfactory, as the wear is not uniformly distributed. There are two features of the piston valve that permit it to be made one of the most perfect balanced valves. The cylindrical walls and the cylindrical valve give the best form for uniform expansion due to heat, and with the least weight of metal give the greatest strength to withstand distortion under steam pressure.

The Allen port was briefly considered. The most valuable material on the value of this is in a paper by Mr. C. H. Quereau before the Western Railway Club.

Mr. Pomeroy's conclusions are that so far as the records go it is highly advantageous to relieve excessive pressure on top of the valves, and that there are advantages from the use of the Allen port, although he finds no figures that establish this latter point "from the standpoint called coal pile."

An abstract of the discussion follows:

Mr. Lewis: We have all sorts of balanced valves, from the plain D valve to the piston valve and the Richardson, both the plain balanced and also the Allen port valve. The latter we use exclusively on our passenger service engines, and are very much in favor of it. We get very good mileage out of some of them—say on an average from 30,000 to 40,000 miles—without taking out the valve. Engine No. 25 ran something like two years and two months before it was necessary to take out the valve on the engine. That is the Allen port valve, Richardson balance, and I am very much in favor of it. For our service—we have very hard service—they have to run the engines ordinarily wide open.

The President: Do you find the Allen port as advantageous in freight as in passenger service?

Mr. Lewis: No, not so much; because we cannot get the travel to get the starting point on a heavy train. But in passenger service we find it is beneficial. We find on an average, during the stroke, about 80 to 85 lbs. of steam, where we cannot get with a plain valve more than 65 or 70. So you see it is a benefit all round; and as for the seats, there is no trouble with them at all, and they go along from the time they go out of the shop

until they come back again, and it is a very important item in the line of repairs.

Mr. MONTGOMERY: I do not think there is any question but that experience with the balanced valve has demonstrated the fact to railroad men that it is a great advantage in the matter of valve wear, and also wear upon the valve motion and eccentrics with larger sized engines or where there is a large pressure on the valve. With smaller engines, perhaps 16 in. or below, we may get along with the ordinary D valve. I have seen engines that have run 20 years with a seat ¾ of an inch high, and I have seen others an inch high that were cut down to the surface of the steam chest joint in five years, which shows that there is a great deal in the matter of the quality of the iron that is used in the cylinders and also in the valves in regard to the friction which causes more or less wear.

Mr. MENDENHALL: At one time the friction was so great that it was necessary to move the valve with a mechanism, and steam reverse levers were put on a number of locomotives in the country for that purpose. With the introduction of the balanced device those were gradually removed from service, and the engine runners were able to reverse their engines or use their levers with one hand, easily with two hands, showing the less friction and less work required by the valve rigging with the balancing device. I think that is evidence that there is much less wear and tear on the valve rigging with the balanced valve. But it would seem that we are now gradually drifting toward the original condition. We use compound locomotives and we are necessarily increasing the weight of the valve very much, and that weight alone makes it almost necessary to do something to enable a runner to handle the valve.

In 1884 I was talking to Mr. Woodcock, the late Superintendent of Motive Power of the Jersey Central. He told me that before he applied the balanced valves he had to face the valves of his fast engines every six weeks, and after he applied the balancing device they were able to run from nine to twelve months; consequently any one who has had experience of that sort is liable to make the best of a device that is going to save his repairs to such an extent. Within the last month I made a long tour in the West, and met many railroad men, master mechanics and others, and we got talking about the various appliances that had reduced the repairs to locomotives to the greatest extent within the last five or six years; and a most intelligent master mechanic, in charge of a large shop—a man who can see the advantage of any improvement as keenly as any man in the country—said to me: "We are using now a great many false valve seats on our engines. They are a nuisance; there is no end of trouble with them. If we had introduced balanced valves when you and I were foremen of the shops, we would not have a false seat on the road."

Mr. MEDWAY: Our engines are all equipped with the Richardson balanced valve, which has given us very good satisfaction. I have no definite data, but from general observation I know that the balanced valve is preferable. We can prove that by noting the pull on the reverse lever when the balance strip or spring is broken. I think that on modern locomotives with a large valve area and high steam pressure the unbalanced valve is out of the question.

Our rule for balance is 52 per cent. of the entire valve surface. As an experiment, on our last two engines, equipped with Allen-Richardson valves, I increased the balance to 55.4. I am of the opinion, however, that the balance is a trifle too high, from the fact that at the moment of starting the engine there is a decided blow through the exhaust pipe. That is evidently caused by the excessive overhang of the valve when at its greatest travel.

THE PRESIDENT: Is there any advantage in the Allen port on freight service?

Mr. MEDWAY: We do not use the Allen port on freight service. With regard to the Allen port, it is known to have an advantage in steam admission, but no particular advantage as to release. In view of this difficulty we increased our auxiliary port to ⅝ in. wide. The engines do remarkably good work at short cut off and high speed.

Mr. BLACKALL: We have a locomotive, No. 210, which has been running with the same Richardson balanced valve for six years. Before that the valve seats wore off pretty rapidly.

Mr. ERRICKSON: As Mr. Pomeroy stated, I was one of the first that ran the Richardson valves on our road. We got engines at that time on the New Jersey Central road which were the largest passenger locomotives in the world. The increase of the port area was so great that no man living could handle one of those engines with the valve open. If you wanted to hook them up you had to shut them off. The result was with engine 164, we had to face her valves every 30 days, making 150 miles a day. After the Richardson appliance was put on that engine ran 15 months and the valve was taken up without any perceptible wear. While 20 years ago it was not absolutely necessary to have a balanced valve, it would have been a benefit even at that time. To-day it is absolutely necessary, because you are carrying higher pressure.

There is no gentleman having to do with locomotives to-day who can say that we can get along without a balanced valve. If it is a piston valve—of course, that is the finest valve we have got. But that valve is expensive, but the Richardson balance is cheap. I am running a locomotive to-day which I have run 80,000 miles since she was overhauled, and the valves, to all appearance, are in perfect working order. She will have to go in and have her tires and some other work done on her, but her eccentrics and links are just as perfect as at first, except the natural weight coming on to it. That engine, carrying 160 to 190 lbs. of steam with 19-in. cylinders and the large port necessary, could not possibly be handled without the balanced valve. If I break the spring in one of those locomotives I have to go and have it fixed at once. There is another device that is used now—a movable adjustable plate on top of the valves, and I believe, as long as we are speaking of this thing, it is a good thing to bring up. I think the Richardson had a solid plate, or the steam chest dressed down.

Mr. HAMMETT: Planed down, giving the distance about $\frac{1}{16}$ in.

Mr. ERRICKSON: There never ought to be more. I think this is patented by some other gentleman. It applies to the Richardson patent. This plate you can regulate to suit yourself. As your valve becomes half worn you necessarily lower the valve, and you have to plane off the plate. If you leave the space too great, say ¼ in., or ⅜ in., the pressure alongside of those gibs will blow them down, and you will get a decided blow on the start, because it blows over the gib and down through the opening in the exhaust. We have some of those engines, and we have at times to plane off the steam chest. It is not advisable to do that, because the time will come when you will want a new valve, and when you do want a new valve you have either got to plain that valve away or get a new steam chest; so with the adjustable plate on top—as your valve wears down you simply regulate it down to the gibs the proper distance, and it runs along any length of time. I believe it would pay to balance every single valve; it doesn't make any difference how small it is. If it is absolutely necessary to balance large valves, it is certainly a benefit to balance small ones.

Mr. MINSHULL: We had ten engines; five had the balanced valve and five the unbalanced valve. Those with the unbalanced valves gave us trouble on account of broken valve stems. That never happens with the balanced valve.

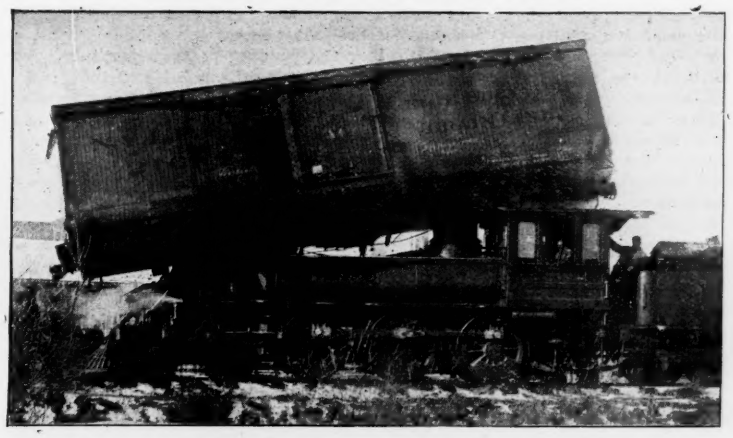
With regard to the movable plate, we had engines with the balanced valves, and those plates on for the last twelve years. We call it a pressure plate, and when it is necessary to face your valve, we insert a washer between the steam chest and the balanced valve and the valve that we originally put in. The engineer says he finds it a decided advantage in the handling of the engine. He ran the engine for several years past, and says that since that has been put in the engine is handled much better than before.

Mr. FORNEY: It seems as though it (balanced valve) was one of the greatest improvements made in locomotives. It is one of those curious cases in which all the advantages *are* advantages, and there seem to be no drawbacks to them. In the the first place, it increases the amount of effective work which a locomotive can do, because it lessens the amount of power consumed in moving the valve. In the next place, it lessens the amount of the wear of the valve in its seat. Next, it lessens the amount of wear in the valve gear; and, lastly, it lessens the amount of wear in the muscles of the engineer, which is a matter of some importance, perhaps. So that, altogether, in view of the fact that the size of the valves is gradually being increased, and the pressure of steam is gradually being increased, it seems that it would be almost impossible to run locomotives at the present time without balanced valves.

A Picturesque Accident.

The engraving, from a photograph, shows an extraordinary result of a tail-end collision. At the outset we must say that this collision did not occur on the Erie Railroad, although the car shown on the top of the locomotive is an Erie car.

The engine concerned in this accident struck the rear car of the train ahead of it and the car ran up on the engine as shown. The engineer stayed in the cab and was not injured, nor was any one else injured, but some glass in the cab was broken. The engineer ran his train back to a town a mile or more away from where the collision took place and went on to a switch, carrying the box car on the top of the locomotive as he went. The car was so firmly lodged there that "it took considerable tugging to pull it off."



One Consequence of a Tail-Ender.

The forward truck of this car was driven ahead under a loaded flat car, displacing the first truck of that car which it hit, and driving this forward to near the middle of the flat car. Both trucks lodged fast under the flat car, and there they stayed so securely that the car was backed a mile into a yard, passing several frogs and switches, the three sets of trucks carrying it. On its arrival in the yard some wag chalked on it "80,000 lbs. capacity, O. K."

Every old railroader knows that many extraordinary things can happen in a railroad accident, but the variety of things that happened in this one strikes us as having been unusual, at least.

A Case of Inadequate Engineering.

Many serious defects found in the work which so far has been done on the Harlem River Driveway (New York), led the Park Commissioners to appoint a committee of experts to report on the condition of the driveway and suggest means for remedying the defective work. This committee consisted of Theodore Cooper, J. J. R. Croes and W. H. Burr, and their report was presented Jan. 27.

The matters specified for investigation were in substance as follows: First, whether the subway on Section 1 was built in strict accordance with the specifications. Second, whether the foundations provided for in the specifications were sufficient to carry the load. Third, whether the crib work on Section 1 has been built in strict accordance with the specifications. Fourth, whether the crib work, if so built, should have remained in position, and whether the defects therein are due to defective specifications or defective work. Fifth, what defects now exist in the work, and what is necessary to be done to remedy them. Sixth, whether, if such defects do exist, necessitating a rebuilding of a part of the crib work, it is possible at a reasonable expense to build a stone wall from High Bridge south so far as may be necessary by reason of said defective crib work. Seventh, whether the roadway on Section 2 is likely to be permanently affected by the rise and fall of the tide or other causes, and, if so, what should be done to remedy this.

The committee replies to the first and second questions in substance as follows: The subway is an arched passageway 15 ft. wide and 9 ft. high, of cut granite, with a radius of 10.35 ft. It passes under the driveway, in an east and west direction, providing a footway for pedestrians crossing the drive. The rise is 3 ft. At the easterly opening of the arch is a platform 24 ft. by about 12 ft., with granite steps at the north and south ends leading up to the sidewalk of the driveway. There is a similar but shorter landing at the west end of the arch, and one flight of steps only. The floor of the subway is supported on a brick segmental arch 14 ft. 6 in. span. The side walls of the empty space underneath this floor are of concrete about 8 ft. 6 in. high. These side walls have no bond at either the east or west end with the masonry work of the platforms mentioned above or with the masonry work of the retaining wall at the east end of the subway. The entire masonry work is supported upon piles driven 2½ and 3 ft. between centers, re-enforced under the west platform only by bags of concrete deposited among them. These piles were cut off at mea low water level. The vacant spaces among them were filled with small cobble stones within 2 ft. of their tops, after which concrete was placed around the tops of the piles extending 1 ft. 6 in. above their tops under the retaining walls and 2 ft. 6 in. under the platform and stairways.

The original plans contemplated a timber grillage or platform on the tops of these piles under the side walls of the archway between the retaining walls. They also contemplated two rows of sloping brace piles to be driven along the east face of the work to prevent an eastward movement of the same. The Board of Park Commissioners in September, 1894, on the recommendation of the engineer, authorized the omission of the timber grillage, substituting therefor the concrete above mentioned, and later the engineer in charge authorized the omission of the 78 brace piles.

The height of the retaining walls near the subway is about 26 ft. The filling on each side of the subway between these walls is earth extending from the subgrade of the roadway down to the soft mud of the original river bottom. This filling presses outward, tending to force apart the retaining walls at their bases It is calculated that the total outward pressure along the east retaining wall will be about 11,300 lbs. per lineal foot of its length, or more if the distance down to soft mud be assumed greater. The weight of this filling also exerts a pressure of about 3,000 lbs. per square foot on the soft mud, causing it to flow laterally. These influences tend to force the bottom of the wall outward, and there is little to resist them other than the aggregate stiffness of the single piles acting as long beams. A continuous grillage over the tops of all the piles would have prevented such a movement, as would also the presence of bonded vertical joints between the subway foundation masonry and that of the platform and retaining wall. Further, the 78 brace piles would have acted in the same way. Without these safeguards the wall has been pushed outward, opening transverse cracks from one to two inches in the floor of the subway. Cracks were also found in the soffit of the subway. in the eastern faces of the retaining wall and of the stairway masonry. the cracks being widest open at the bottom and gradually disappearing higher up, showing that the pressure was exerted to its greatest force at the bottom.

The committee's opinion is that the failure of this part of the work is due to the omission of the brace piles and to the presence of the unbonded joint, for neither of which the contractor can be held responsible. The committee further says that a grillage should have been placed over the entire foundation and that such construction should be employed on the remainder of the work.

The removal of the centers from the arches before the earth filling had been carried above the top of the arch ring and allowed to settle is condemned.

Since a large mass of riprap has been placed outside of the masonry in the mud, no further settlement or movement is likely to occur, but to make the work secure it will be necessary to take down the side walls and arch of the subway as far back as the cracks extend, and to rebuild the same. Further movement of the masonry at the eastern end of the subway may be prevented by running two anchor rods of moderate size through the empty space beneath the subway floor and anchoring them into the platform masonry at each end of the subway. Long before these rods are rusted out the mud pressures will have been equalized among the piles, so that no further movement need be expected.

The committee's reply to the third question, regarding

the crib work on Section 1, is that the work is not done in strict accordance with the specifications nor faithfully performed. The timbers of the crib have not been properly notched down upon each other and the filling in of the crib work instead of being made with stones up to 16 in. for their largest dimension, has been made with very much larger stones without small stone filling in the spaces. The only way to remedy this deficiency is to remove the crib filling and replace it as specified.

Of the 2,300 ft. of crib work, 300 ft. has failed to support the filling behind it and has slid into the river. Other sections have moved out to a less extent. This is primarily due to the absence of any accurate knowledge of the condition of the river bottom. It was thought that the cribs would be about 18 ft. deep, but after construction was begun no hard stratum was discovered until a depth of 30 ft. below low water had been reached. The cribs were built of the same size in section as had been intended for an 18 ft. depth, but were built to a depth of from 40 to 48 ft. extending up to 12 ft. above high water, which is the grade of the driveway at this point. They are about 33 ft. wide at the base; the base is too small for the height of the crib. It should have been about 20 per cent. greater than the height. The committee does not find the contractor culpable in this case. The defective crib work should, in the opinion of the committee, be removed to a depth of about 18 ft. below low water and new cribs founded on correct lines.

Regarding the possibility of a stone wall from High Bridge south to replace the crib work: In the opinion of the committee such a wall could not be built at a reasonable expense.

Regarding the roadway on Section 2, the specifications called for rock filling for the embankments below subgrade of roadway, and provided that earth and small stones should be inserted to fill all spaces. This was not done, the interstices were not filled up and consequently the rising and falling of the tide has washed away the earth filling which has been placed over the stones, carrying it down into the spaces between them. In the opinion of the committee the only remedy for this is to remove the filling and thoroughly fill up all the lower voids with gravel and small stones, the filling being finally covered with a layer of gravel or gravelly earth well compacted and from 12 to 18 in. thick.

Mention is made of the defective condition of the retaining walls at 155th street. The owner of the adjoining property has excavated 5 or 6 ft. below the foundation of the present wall. This should be underpinned to a depth sufficient to protect it against future contingencies. The committee condemned the clause in the specifications providing for vertical faces of rock in cuts left without a protecting wall, and recommend that all vertical faces alongside of foot walks should be protected by properly constructed walls. Further, there are places along the slopes on the west of the driveway where more rock must be removed or it will ultimately fall into the roadway.

The report closes with some minor suggestions regarding the completion of the work

At the request of the Park Commissioners, Mr. Foster Crowell last July made a report on the condition of the Driveway at that time, and upon certain "plans and estimates" referred to him for examination. These reports, dated July 8 and 17, agree in the main with that given above. Specific questions were not asked, and Mr. Crowell's report is fuller and deals with questions not touched upon by the committee.

Regarding the defective work, the suggestions made by Mr. Crowell differ from those given above in the following particulars: The dimensions of the retaining walls in section 1 are criticised as being too light and the absence of any batter is condemned: the entire masonry of the subway in section 1 should be removed, and a timber grillage placed over the heads of the piles, this, however, not to be done where it is obviously not necessary; the defective crib work should be entirely rebuilt for a length of 300 ft., and partly built for the remainder of the defective portion; the sink holes in the rock filling on the upper section should be filled up from the outside by forcing in sand and clay with a water jet; and in case of this method failing, the fill to be coated with 6 in. of concrete. The filling-in of back bays formed by the line of the driveway was also recommended.

The Reorganization of the Engineer Corps of the Navy.

By Ira N. Hollis, *Professor of Engineering, Harvard University, Formerly Passed Assistant Engineer U. S. Navy:*

I.

The engineers of this country cannot fail to take a deep interest in the bill now before Congress to increase the usefulness and numbers of the Corps of Naval Engineers, to aid technical schools, and to establish an experimental station where many of the problems of interest to builders all over the country may be investigated. It is directly in line with a fuller recognition of engineering as a profession worthy of the respect and rewards due from a great nation whose material prosperity and industrial growth have been made possible by the engineer. Our country is cemented together by the vast railroad system which is directly the work of engineers, and our maritime growth will depend largely upon the skill of engineers, whether those engineers are called marine engineers engine drivers, or naval architects. The recognition has been given cordially in the army, while it has been withheld for many years in the navy, probably because the naval organization, which is largely a survival from the days of sailing vessels, is not elastic, and does not suit itself readily to modern conditions.

The bill as presented to the Senate by Senator Squires, of Washington, and to the House by Representative Wilson, of New York, contains a number of features well worthy of the consideration of Congress. As men in civil life do not usually understand naval methods and organization, it may be well to consider the most important items of the bill, and to explain them somewhat fully.

1st. *The first part of the measure fixes the number of commissioned engineers in the navy at* 303, an increase of 130 over the number now borne on the Naval Register, or of 110 over the number actually allowed by law. This increase is in accordance with the recommendation of the Engineer-in-Chief, who has stated in several annual reports that the number of engineers is now insufficient for the duties to be performed on shore and on board ship, and that the property of the government is suffering for want of sufficient care and attention. He has called the attention of Congress also to the fact that matters will be much worse in the near future when the new ships, now building, are completed and commissioned. The number of engineers in the navy at the end of the war was 474, and in 1880 the number had dropped down to 250, the allowance by law being 270. It will be seen, therefore, that this bill simply restores the number to somewhat the same proportions it bore when we had a navy of wood with auxiliary steam power.

The duties performed on shore by the engineer consist of the design and inspection of the propelling machinery and boilers, and of certain auxiliary machines for all our ships; of the care of navy yard machinery under the control of the Bureau of Steam Engineering, and the inspection of boilers; of the superintendence and inspection of all repairs to machinery; of all the routine duties incident to examination of men for employment or enlistment in the engine departments, and to the examination of officers for promotion, and of the inspection of certain materials for use in the naval service. The duties of the engineer at sea consist of the care of propelling machinery and of most of the auxiliary machinery; of the repairs to all machinery; of keeping watches in all except the smaller vessels, and superintending the running of machinery; of looking after the storage and expenditure of coal and stores; of keeping that part of the double bottom and inner skin of the ship beneath the machinery and boilers properly cleaned and painted; of looking after the efficiency of all pumps; of keeping in good condition all water-tight doors in the machinery and boiler compartments; of making all official reports and requisitions under the cognizance of the Bureau of Steam Engineering; of maintaining a division of from 20 to 196 men in a state of organization and efficiency, the number of men depending upon the size of the ship; also of requiring and inspecting the clothing for these men; and of other duties, such as court martial, official inspections, ship visiting and examination of provisions and stores, which all officers, line and staff alike, have to share. Men outside of the navy who see the new ships and read about their performances constantly express astonishment that the enormous increase of machinery should actually be accompanied by a decrease in the number of engineers, and it is a puzzle even to the naval engineer to find his services rated less, while greater responsibilities are being placed on his shoulders. As this paradox is the result of great changes within a comparatively short period, both of materials and of the nature of the responsibilities thrown on the officers of the service, it is deserving of extended consideration.

Among the advances most important to the human race have been those connected with transportation, both on sea and land. Marine machinery is now fast replacing sails, and the day is near at hand when it will not pay in the merchant service to run a sailing vessel. A man who to-day should design a fast mail steamer with great sail power would be considered a lunatic. The navy, also, has changed, sometimes leading in the march of improvement, sometimes lagging behind. Our warships have practically abandoned sails. Not even an officer of the old sailing navy would dream of putting sails on a battleship. The latest vessels, such as the New York, Columbia and Indiana, have not a stitch of canvas, unless it be a few awnings or windsails. They are machines from stem to stern, which depend for their efficiency in times both of peace and war upon the force of mechanics and firemen placed on board. These ships cannot keep the sea for long periods without coaling and repair stations within easy reach of each other, unless they are accompanied by colliers and carry with them a large force of engineers and mechanics, and great numbers of spare parts. For maintenance in an effective cruising condition they are largely dependent upon the energy and zeal of their engineers, and in case of accident to machinery or boilers they are absolutely dependent upon their engineers.

The change to these conditions has come about with startling suddenness. Forty years ago ships were rigged with full sail power, and barely enough auxiliary power to clear the land and to begin the cruise under sail alone. At the outbreak of the war some of our cruisers had no machinery at all. All of the officers of the line down to the commander's list entered the navy under these conditions, and most of the officers, down even through part of the lieutenant's list, began their naval life on ships with little or no steam power. The consequence is that now we have a number of men shaping our naval policy and commanding our warships whose traditions and beliefs belong to the past, men who cannot, by the very nature of the changes, adjust themselves to modern requirements. Even the engineer corps itself has suffered in the upper grades from the lack of experience with the new machinery. Many of the commanding officers and some of the chief engineers have hardly had time to serve on a new cruiser, and not half a dozen of them have had duty on a modern battleship. It is no discredit to the men who command our ships and who would, without doubt, fight gallantly for the flag in time of need, that they have not yet adjusted themselves to their new surroundings. It is only a pity, for the sake of the efficiency of the navy, that they have arrayed themselves against every change that does not recognize and make more secure their own positions as the only part of the service which deserves consideration. While our older officers have been going to sea or marking time in navy yards, and our younger men have been imbibing their traditions, the technical schools and universities have turned engineering into a profession whose claims are second to none in our country, and vast manufacturing establishments and railroads have grown up under the hand and eye of the engineer, whose progress has been watched and applauded on shore by people unfettered by traditions of a past.

Every effort of the Engineer-in-Chief to bring the numbers up to modern necessities has been thwarted, in part by men who are conscientious in the belief that our service will go to the dogs if the engineer gets a firmer grip; in part, by men who care nothing about the good of the service so long as the interest of a class is served. The only argument produced against the increase of numbers worth listening to for a moment, is that scientific men are not needed to run our engines, and this argument does not bear examination. The statement made by line officers to the Secretary of the Navy, to Congress and to the public is that we do not need so many high-class men in the engine-rooms and fire-rooms; that what we really want on the cruisers and battleships is one, or perhaps two, educated engineers, and a number of machinists. Along with this argument goes the assumption that the deck officer, who has charge of a gun, must be highly trained in science and exceptionally well versed in international law. When we stop to think that the New York, which is a flagship, contains 16 of such men, and that the Yorktown, which is one of our smallest ships, contains eight, we realize what a preposterous conclusion has been reached here. The writer has no disposition to lower the status or educational qualifications of the officers of the line; on the contrary, he believes that education and intelligence are the only guarantees of a really efficient personnel, whether it be above decks or below. So far as the absolute working of the guns, the passing of powder or the starting of a steam engine is concerned, they involve the same grade of intelligence and may be classed among the manual arts which most men can learn by a moderate amount of practice; but these functions form a very small part of the duties of officers on board ship, either of the line or of the engineer corps.

If the first lieutenant of a ship has to organize and discipline the crew to stay at the guns and to work them in action, the chief engineer has a much more difficult task in organizing and disciplining a division of machinists, oilers, firemen and coal-heavers to remain below decks shut up in water-tight compartments and to run the machinery and boilers under a nervous tension hardly understood by men on deck, or in the turrets. In time of action the engineers' division would be scattered through half a dozen or more water-tight compartments completely cut off from one another, while the chief engineer would probably be in one of the engine rooms dependent for his control of the men upon the uncertain communication of speaking tubes or of telephones. Can anyone doubt that this control would be far more effective with an intelligent commissioned officer in every principal compartment? The word commissioned is used here because it takes education and a commission to hold a man up to the very highest sense of responsibility amid such surroundings. The captain of a ship would feel helpless without an officer in every turret, with every heavy gun, with every group of small guns, and with the powder division. Only a lack of appreciation of the duties below could bring him to believe that less responsibility attaches to the duties in the water-tight compartments. We have heard a great deal about the man behind the gun; as a matter of fact, the fireman who brings the gun into action and carries it out again is just as much behind the gun as the powder boy, or the man who pulls the lock-string If a distinction is to be made, the fireman might be called the man behind the ram, an instrument that may play a far more important part in warfare than the gun or torpedo.

Besides the organization of the engineers' division, the chief engineer and his assistants have no light task in keeping the machinery and boilers always ready for use; a repair shop must be kept running on board ship all the time. Still further, every ounce of coal must be used with the utmost economy. With the exception of the Columbia and Minneapolis, hardly a ship in the navy could keep the sea a month without re-coaling, and every pound of coal saved would go to increase the endurance and effectiveness of a warship. Neither the price of coal nor the salaries paid to the officers should cut any figure in the matter. It is solely a case of bringing greater intelligence into the engine-room that a ship may keep the sea longer. So far, from lack of officers, the Bureau of Steam Engineering has done practically

nothing in the study of the use of coal on board ship. We know that feed pumps use a great deal of steam, that dynamo engines are exceedingly wasteful, but just how the steam or coal is distributed among the different engines, nobody knows. The government would probably save thousands of dollars by sending enough officers with our machinery afloat to make a thorough study of this question. In this the Engineer-in-Chief is helplessly bound by navy regulations and lack of men.

There are in the whole engineer corps of the navy 173 officers against 146 in the line who have attained command rank. Yet we have a proposition from the Secretary of the navy to increase the number of commanding officers in order to afford adequate promotion and rewards for officers of the line. If one is to judge by his annual reports, the Secretary has no realizing sense of the significance of the struggle that is now going on between the corps of the navy, and this brings out another difficulty in dealing with the engineer question.

For many years our Secretaries of the Navy have been lawyers, with little knowledge of maritime or military affairs, and with absolute ignorance of shipbuilding and marine engineering; this, too, at a time of transition when our navy is rapidly becoming an aggregate of huge machines. A man who accepts the office of Secretary without experience and judgment in the business he is going to undertake should, therefore, invite experienced men into his councils and should depend largely, if not wholly, upon their opinions. If he is a strong man he will have sense enough to discriminate intelligently and to judge properly the characters of his subordinates; but if he is a weak man, of poor judgment, he will quickly fall into the hands of the men whom he sees oftenest in the department or in the society of Washington, and who are the most plausible and glib of speech. There has been a tendency of late years to surround the Secretary as much as possible with officers of the line, and to make the line the sole channel of communication between the staff corps and the Secretary. This has not yet been entirely accomplished, but so nearly so that the Secretary is in great danger of becoming the mouthpiece of a class, or rather of a group of officers selected from a class, with small experience at sea, but with large experience in adapting themselves to the forces which govern Washington society, and, to some extent, the Congress of the United States. It is small wonder, then, that the present Secretary is committed wholly to legislation for the line; the wonder is that he did not recommend the abolition of the staff.

A third element in this struggle against the engineer is the feeling with many officers of the line that engineers have to deal with oil, steam, coal and iron; that they often get dirty on duty, and therefore have somehow not the same claims to recognition as officers. Fortunately for the good of our service and for the happiness of the officers who have to live together on board ship, the Naval Academy is dispelling this illusion. No fair-minded man whose classmates are engineers and have the same claim as himself to respect for their attainments and cultivation, can cherish this idea. To the public it makes little difference whether a man's face and hands are blacked with coal dust or with powder so long as the honor of the flag is maintained.

The proposition of the line for the improvement of the Engineer Corps may be summed up very briefly as follows: To send very few engineers to our ships, and to replace them wherever possible by machinists, whose pay they have fixed at from $40 to $70 a month, and to obtain at the same time the same sense of responsibility and the same interest and intelligence in keeping up the efficiency our machinery. It may be added that a further plan contemplates making these machinists warrant officers in case they display the proper amount of subordination and zeal.

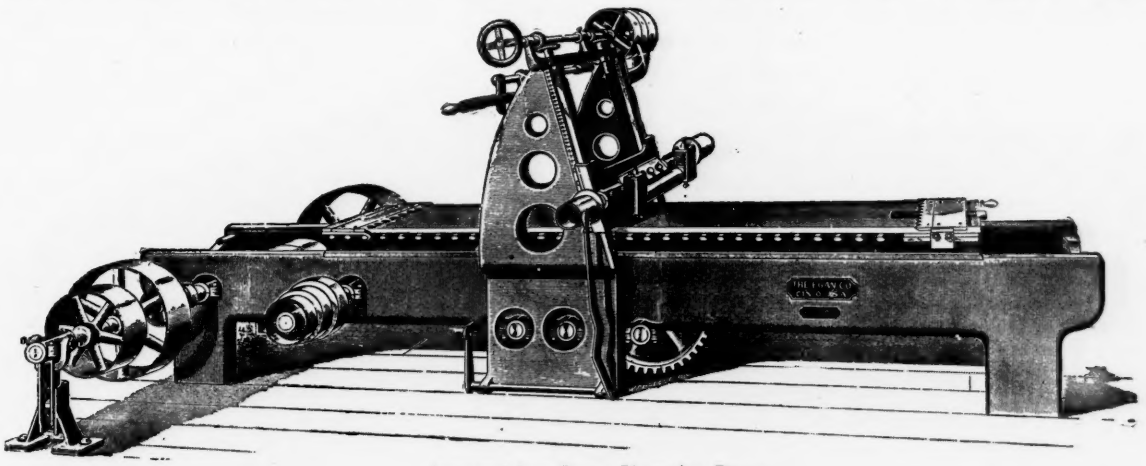
Under such circumstances one could not blame the engineers for extravagance in their demands, but they have been singularly moderate in the request for increase of numbers; as before stated, Congress is simply asked to do a little more than restore the numbers of 16 years ago.

2d. This brings us to the second point in the bill: *To increase the upper grades of the corps in about the same proportion as the total increase.* At first glance there does not appear a necessity for so many engineers on the captains' and commanders' list, and yet when we reflect that the percentage of the whole corps on these lists will be no greater than that in the upper grades of the line, we can see a sound reason for the increase. It would only lead to a repetition of the present discontent and uneasiness not to give the engineers the same rewards and pay as are received by the line. The time is past in the navy when one corps has greater claims to rewards and promotion than another. Individuals may win great reward and grateful recognition from the country; and because the line officer may sometimes have greater opportunity to display his courage and good judgment in action, it does not follow that we have a reason for giving the whole corps rewards that belong only to the man who wins them. One of the worst features of the service is promotion according to seniority. There is no method of gaining advancement by the display of exceptional qualifications for command or for exceptional constructive attainments. In a few cases since the war the Senate has passed special bills promoting officers for bravery or unusual zeal in the service. The present Engineer-in-Chief, Mr. Melville, was advanced in that way for his great ability and endurance in bringing his boat crew out of the Lena Delta after the loss of the Jeannette. It seems a pity that the proposed bill should not provide some method of selection for promotion to the higher grades. A man's ability is at present too often rated by his place on the list. If he happens to be number 70 on the list of chief engineers, he knows only four-sevenths as much as the man who is number 40. No method could be better devised to sap the energies of a corps.

[The conclusion of Professor Hollis' thorough analysis of this important subject will appear in our next issue.]

Iron Frame Dimension Planer.

The machine shown herewith is an improved iron frame dimension planer made by the Egan Company (J. A. Fay & Egan Co., of Cincinnati), designed to do all the work that can be done on the Daniels' planer at a greater speed. It is especially recommended for car and bridge works and makers of milling machinery.



Improved Iron Frame Dimension Planer.

The machine is designed to plane work 24 in., 28 in. and 30 in. wide and up to 24 in. thick and from 10 to 60 ft. long. It is especially adapted to surfacing dimension stock and will take stock out of wind. When fitted with feed rolls it will surface stock up to 4 in. in thickness. The feeding rolls can easily be thrown out of gear when the machine is used as a dimension planer. The frame as shown here is of iron, amply strong, planed through out on the top for the table to run on, and with inside gearing to work the table, either with a rack and pinion or with a rope. The same machine is made with a wood frame at less cost.

The countershaft is at the back of the machine, and so placed as to give the proper tension to the cylinder belts to insure steady speed when taking a heavy or light cut. The machine has three speeds of feed.

The cylinder is of solid steel slotted on four sides, belted on each end and with large journals of extra length. The cylinder is made to raise and lower by power or by hand at the will of the operator. Suitable arrangements are made to hold the stock solidly to the bed while being worked.

There is a pressure roll on either side of the cylinder to hold the timber while the cutting takes place. The chucking device for holding the stock is simple and easy to adjust.

The tight and loose pulleys are 14 in. × 6½-in. face, and should make 850 revolutions per minute.

The National Association of Manufacturers.

The first annual convention of the National Association of Manufacturers (organized in Cincinnati January, 1895) was held in Chicago, beginning Jan. 21.

Mr. Thomas Dolan, of Philadelphia, the President of the Association, made a moderate and sensible address. He pointed out some of the inequalities in the present tariff law, and suggested that the association should undertake to bring about such changes in the tariff as will produce fairplay for all domestic manufacturers. He said that our own market is the best in the world; better probably than any other two or three markets in existence, and is the only market which we can absolutely control. He questioned if it can be proved that the productive capacity of our manufacturers is in excess of the consuming capacity of the American people. The markets of the world are all occupied by rivals most of whom can produce cheaper than we can. We have little to gain by competition outside of our own country, but our own home market should be cherished.

One of the needs of this home market is multiplication of means of transportation, and to this end internal canals should be encouraged. Furthermore, stability of rates are important, giving the assurance that all shippers must pay the same prices for the same service.

On motion of Mr. Charles Heber Clark, of Philadelphia, a committee was appointed to report on the menace to American industries now appearing in Japan. The report of that committee showed that in 1863 the first cotton spinning mill was built in Japan with 5,456 spindles. At the end of 1893 there were 46 mills with 600,000 spindles, and a more rapid increase is expected in the future. Large orders have been placed for machinery for Japan and some orders for fine yarns. Japan threatens to become a bold and large competitor for the trade of the world in cotton fabrics, and the Japanese begin with mechanical appliances superior to those found in some American mills. But Japan is also advancing in other industries and appearing in the markets of the United States. Articles of Japanese manufacture now undersell American articles in Eastern cities. Matting, rugs and brushes are sold below the prices of American products, and American watch case makers are selling cases to Japan for excellent movements made there for this market. A resolution was introduced requesting Congress to appoint a Commission or to direct one of its own committees to inquire respecting this invasion of the American market.

The Committee on Resolutions submitted a platform which was adopted, the provisions of which are, that as far as possible our home market should be retained and supplied by our own producers and our foreign trade extended; that the principle of reciprocity should be embodied in national legislation; that a judicious system of subsidizing ships should be adopted; that the Nicaragua Canal should be built and worked under the control of the Federal Government; that natural and artificial waterways should be improved by the Federal Government connecting the Great Lakes with the Mississippi and the Atlantic.

A resolution was adopted urging that Congress pass at an early day a national bankruptcy law to unify practice in the various states A resolution was brought in and referred to a committee empowering the Executive Committee to take action with regard to state laws against foreign corporations. Another resolution requests Congress to direct the Interstate Commerce Commission to prepare a uniform freight classification and to order the same to be put into effect Jan. 1, 1897. Mr. S. W. Allerton tried to get an amendment permitting pooling, but this was defeated. Mr. Warner Miller introduced a resolution which was carried, that in the sense of the convention a Department of Manufactures should be established in the national government with a secretary of equal rank with the Secretary of Agriculture.

Resolutions were introduced and referred to the Executive Committee, requiring commercial agents to be placed in the markets covered by agents of the National Board of Trade of Great Britain, and requiring a committee on the establishment of treatise of reciprocity.

Prof. W. P. Wilson, of the University of Pennsylvania, introduced a resolution which was adopted, to the effect that the Association urges on Congress an immediate and complete consular inspection; and that it is the conviction of the Association that a calm and dignified representation of the United States in consular service can only be had by appointing trained men, who have been tried by experience in the business relations of the country and are identified with its interests; and urging upon Congress larger appropriations and a more liberal treatment of the consular bureau.

Mr. Theodore C. Search was elected President for the coming year, and Mr. E. P. Wilson, of Cincinnati, was re-elected Secretary.

An Electric Locomotive.

Last week a large electric locomotive, built for experimental purposes by the Baldwin-Westinghouse combination, was shipped from the Baldwin Locomotive Works at Philadelphia to the Westinghouse Electric & Manufacturing Company, at East Pittsburgh, where the electric equipment will be put in. This locomotive is intended for passenger service and has two four wheel locomotive trucks, each with a 6-ft. wheel base and 42-in. wheels. It is designed for 1,000 H. P., and the weight on drivers is 120,000 lbs. A short line has been built near the Westinghouse Electric & Manufacturing Company's works, on which this locomotive will be tried.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The oppression of the inventor has long been a popular topic. We cannot remember when we first began to hear how hard it was for inventors to advance against intrenched ignorance, and bigotry and selfishness. This well-worn theme is taken up in the February issue of the *Engineering Magazine* by Mr. W. C. Dodge, a patent solicitor. Of course Mr. Dodge mentions Galileo. We have been discouraging inventors for years and have covered the field between locomotives and nut-locks and should not like to guess how many times we have been asked to take warning from the case of Galileo. One of the most recent instances of this sort was when a milliner came to us with a rail joint which she had invented and patented. She knew absolutely nothing of what other people had done; nothing of the ways of working metal or of the strength of materials, or of the stresses to which rail joints are subject, and in fact had no more fitness to design a rail joint than a twelve-year-old schoolboy; not as much as a sharp boy might have. When we advised her to hang up her model as a warning against waste of energy and to confine her attention to improvements in bonnet frames, she suggested that Galileo had been treated in much the same spirit. Every man who offers to save 110 per cent. of your locomotive fuel, or to automatically stop a train when a cow gets on the track, is not Galileo, or even James Watt, but he generally thinks he is. Whatever may have been the history of the progress of invention in the past—and it is quite true that many of the greatest improvements have been retarded by ignorance and stupidity—the danger to-day is not that inventors are unduly discouraged, but that they are unduly encouraged. Not much fault can be found with the conservatism and prejudice of a generation which has bought Keeley motor stock; which has found capital to invest in a bicycle railroad, and which sees great sums going into the pockets of people who control a method of making calcium carbide before those people have demonstrated that acetylene gas can be produced at commercial prices or that the patents for making calcium carbide will protect the process if the industry ever becomes valuable. In fact, there is to-day so much unemployed money, and there are so many people keen for extraordinary profits, that very little plausibility is needed to finance and promote an invention of the least promise. The discourager of inventors has a great duty to perform. It is his business to keep investors from wasting their money and inventors from wasting their energy, and instead of being a retarding influence in civilization he is one of the most important of public benefactors.

It is a pleasure to be able to record that on Tuesday of this week the American Line steamer St. Paul was successfully got off, and that she made her pier in New York Harbor under her own steam, and is said to be uninjured. Now interest will center on the investigation into the reason why she ever went aground. Much has been said about the "racing" between the Campania and the St. Paul. It is possible that after these steamers came in sight of each other they were speeded up somewhat above their normal journey speed. We do not know whether or not that is so. It is extremely improbable, however, that they were run at a dangerous speed. No man has so much to lose by dangerous racing as the captain of a great liner. His responsibility does not end with the lives of the passengers and crew, and with the value of the vessel and its cargo, but his whole reputation and future career are staked on bringing his ship safe to port. The captains of the trans-Atlantic liners do not occupy their positions by accident. They are selected men and are selected by a severe and long-continued process. So, while irresponsible newspapers find pleasure and possible profit in sensational talk about ocean racing no well informed person takes this talk seriously. But granting that the ships did run for a good many hours at a speed higher than their normal, what has that to do with the grounding of the St. Paul? She ran "dead slow" for something more than one hour (possibly for two hours) before she grounded; this because she was in a fog. The same is undoubtedly true of the Campania. The St. Paul went ashore because she was out of her reckoning, but the Campania was also 10 or 11 miles out of her reckoning. How both ships came to be so much out of their course is the mystery. It is inconceivable that mistakes of the same kind and of the same degree were made by the navigating officers of both ships. The chances of such a coincidence are very small indeed. Some obscure element entered to vitiate the calculations, and this element affected both ships alike. An officer of the United States Navy, now in the Bureau of Navigation, is reported in the newspapers as having said that there is an uncertain and irregular retardation of the current of the Gulf Stream, which may have been sufficient to account for the error. In the case of the St. Paul there may have been, as we have been told by the newspapers, an error of 10 fathoms in reporting the soundings; or there may not have been.

The Joint Traffic Association.

The new traffic association of all the principal railroads east of the Mississippi and north of the Ohio has now been running a month, and it seems to have met the expectations of its most hopeful friends. The President of one of the principal roads told a New York reporter that he could not remember the time when rates were so well maintained as during the whole of the month of January. The correctness of this view is corroborated by reports here and there as to the attitude of local soliciting agents toward shippers and the rigid manner in which city ticket agents maintain rates and freeze out applicants for concessions. People are every day running against the rules prohibiting the issue of passes, and they are stunned more severely than ever before. All of this confirms what every cool headed railroad man knew all the time, that each railroad president could easily maintain rates whenever he made up his mind to do so. After signing a formal agreement to stick to the tariffs, and having this put on record at a meeting of his Board of Directors, a president naturally would make up his mind.

Early in the month it became evident that a few shippers were disposed to hold back freight with the expectation that some weakness in the agreement would develop very soon, and it is even reported that some traffic men believe this holding back trick has been worked quite generally. We do not know to what extent this may be true, but the shipments out of Chicago, according to the published reports, have held up pretty well, averaging 80,000 tons a week, which is about 75 per cent. better than last year's movement.

But the sharp shippers, controlling large quantities of freight, and who have heretofore offered their shipments to one road after another until they secured a secret reduction, have winced under the maintenance of tariffs, and within the last 10 days the reporters have published numerous statements evidently inspired by dissatisfied shippers. One Western correspondent makes out that the Canadian Pacific is getting a tremendous quantity of wheat, oats and other grain, and in his excitement he states that the road carries the freight in cars to St. Johns, Newfoundland, where, we presume, it is sent forward to England through a pneumatic tube. Some shipments of provisions for Europe have been sent from Kansas City to Pensacola. A good deal of corn has gone to Galveston and still more to New Orleans. The Norfolk & Western is reported to be having a larger export traffic than ever, and the Chesapeake & Ohio is said to be taking corn to Newport News, in great volume, just the same as it did in former days when it was a wicked rate-cutter. St. Louis merchants are particularly incensed, and the Toledo, St. Louis & Kansas City (not a member of any association) is said to have taken more than one-third of all the freight out of that city. Westbound freight is coming to St. Louis by the Cumberland Gap Dispatch. Prominent shippers vow that they will not send a pound of freight over the Joint Traffic lines, and one report says that a resolution of this tenor has been formally carried at a meeting of the Merchants' Transportation Association. We do not know what this association represents, and everyone does know that men who vote for such resolutions always abide by their vote or not, just as they see fit; but the incident nevertheless shows very clearly the attitude of the St. Louis shippers' minds.

But all this is only what was to be expected; and, indeed, if throwing all the freight over to the Clover Leaf line does not have the desired effect we may next expect to see a large movement over some one of the weaker lines in the association. The Clover Leaf, not being a member, runs the risk of having to meet the competition of all the other lines acting unanimously, but if a line within the association gets an unusually large share there is—or rather there was, under former conditions—a first-class chance for a family quarrel.

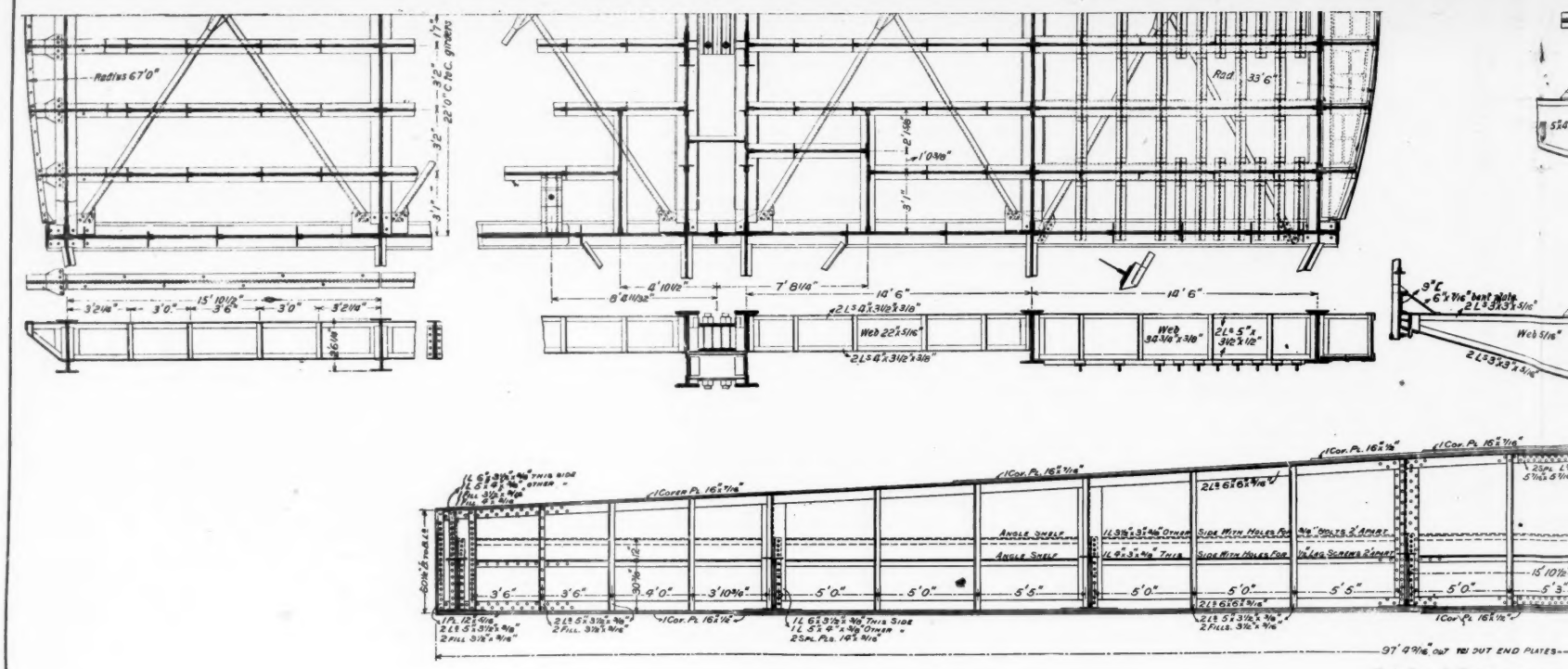
One question contains the key to the whole situation, and that is whether the roads will hold together. Thus far they show no sign of weakness, and the members of the Board of Managers seem to be perfectly calm and cheerful. For the present, at least, it must be assumed that the disgruntled shippers are yelling "fire" rather more loudly than the actual flames will warrant. They have given enough business to the Clover Leaf to make a wound in the elephant's hide, but it remains to be seen whether the elephant will take the same view of it that they do. Possibly what looks large to them will look small to him.

There are two problems before the Board of Managers, one to deal with the alleged loss of traffic to outside lines, as for instance, to the New Orleans route to Europe, and second, unequal distribution among members. It is by no means certain that grain going by the Canadian Pacific or by New Orleans is to be regarded as lost. Perhaps it does not rightfully belong to the Joint Traffic lines. The talebearers do not say where the Canadian Pacific got its grain, but presumably it came from the Northwest, and no doubt a conservative Trunk Line man would readily concede a good share of this traffic to the Canadian line. The roads carrying from St. Paul to Chicago have strenuously endeavored to get just as much freight and to get just as good prices for carrying it, as they did before the establishment of a direct line under one management to the seaboard via Sault Ste. Marie, but experience must be gradually teaching them that this will always be a hard fight. To get grain to move by way of Chicago they must not only carry it very cheaply, but must ask the lines east of Chicago to take about 15 cents or less, and the managers of the latter lines, if they act on a rational view of the conditions, may very likely decide that they have better use for their cars this year than to carry grain at that price.

New Orleans has always found it easy to get corn for export when there was a heavy crop in the far West, and it is probable that the lines to the Atlantic seaboard will not be any more grasping now than in former years. Moreover, they now have in the Illinois Central a more powerful New Orleans competitor than ever before, and discretion may be the better part of valor in the fight. The Illinois Central is reported to have made a contract to take about 200 cars of corn daily to New Orleans for six weeks, and as it has a railroad not crowded with other business, and controls both the gathering grounds and the terminals at New Orleans, it is in a position to make rates very close to cost if it finds it necessary to do so.

And, howsoever much the movement by outside lines may affect the volume of freight over the Trunk Lines, the remedy is simple, whenever the time comes to apply it; that is, to reduce the rate to the Atlantic coast by all lines. There is as yet no sign that this will be done. The problem of unequal distribution among the members of the association is not yet ready to be dealt with. The Board of Managers can quickly advise a reduction in rates, over lines that have lost traffic, whenever the loss shall be clearly apparent, but nothing accurate in this line will be known until at least one month's statistics have been gathered.

Meantime, the District Attorney at New York, on whose shoulders has fallen the burden of carrying on the fight against the Joint Traffic Association, which was so valiantly begun at Washington by Mr. Morrison and his press bureau, seems to be dealing very leniently with the railroads; he has agreed to a postponement for two weeks of the hearing on the application for an injunction, and he evidently is will.


Radius 67'0"
22'0" C. to C. girders
Rad 33'6"
Web 22"x5/16"
Web 34 3/16"x 3/8"
2 L's 6"x 3 1/2"x 3/8"
2 L's 5"x 3 1/2"x 1/2"
Web 5/16"
2 L's 3 1/2"x 3 1/2"x 5/16"
1 Cor. Pl. 16"x 7/16"
2 L's 6"x 6"x 7/16"
Angle Shelf
Side With Holes For
3/4" Bolts 3" Apart
1 L 6"x 3 1/2"x 7/16" This Side
1 L 5"x 3 1/2"x 7/16" Other "
2 Pl. 12"x 7/16"
2 L's 5"x 3 1/2"x 7/16"
2 Fills. 3 1/2"x 7/16"
97' 4 9/16" out to out END PLATES

Details of Superstructure.

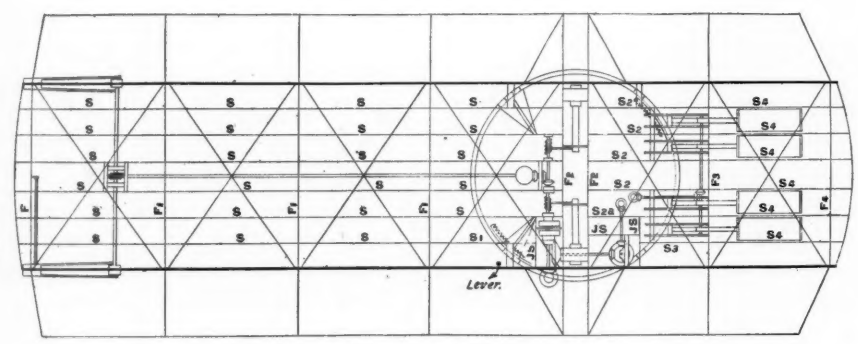
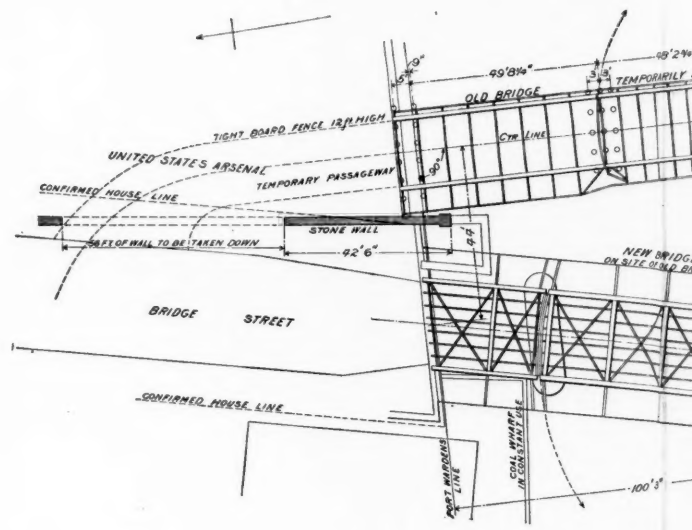
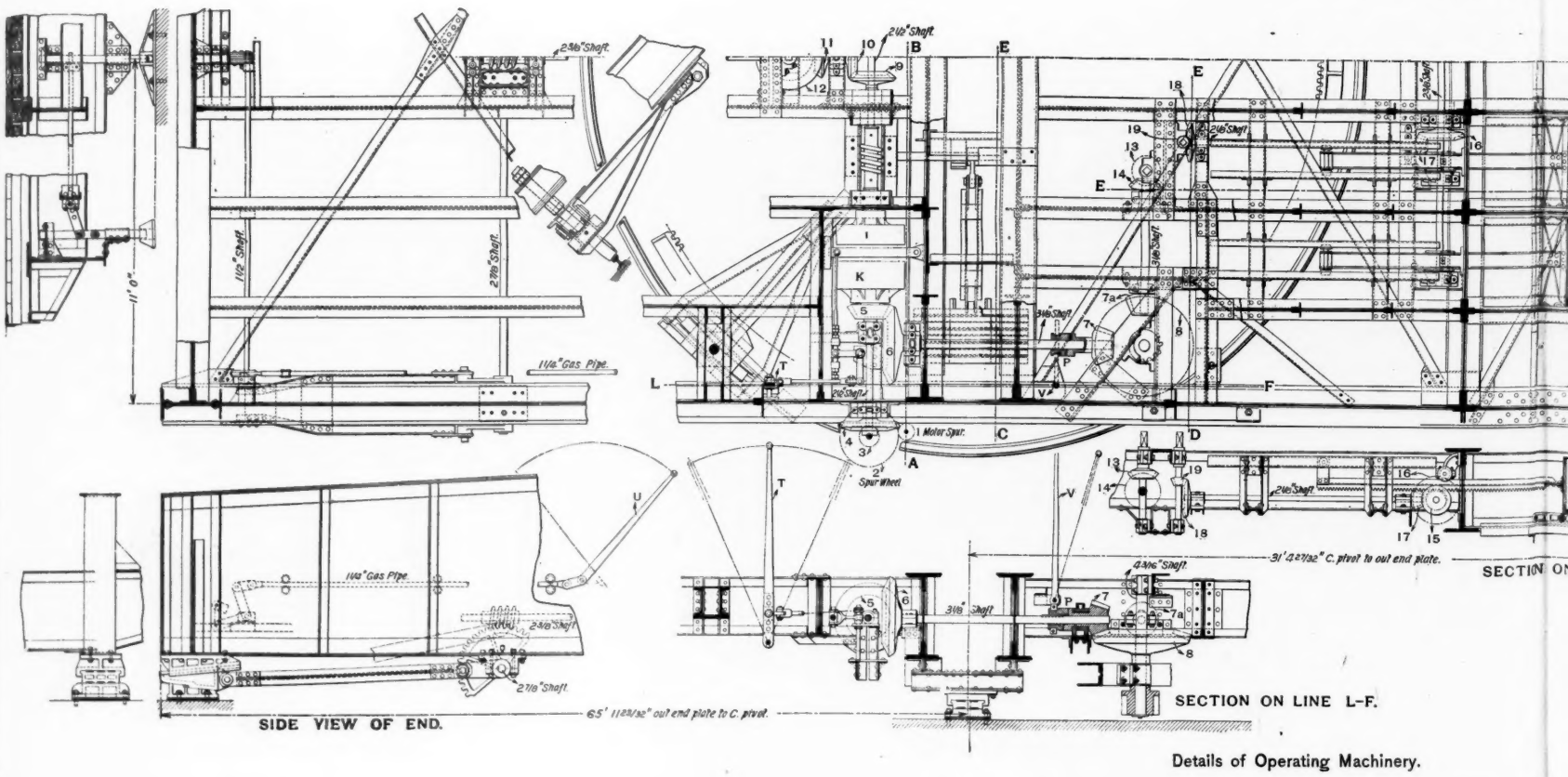


Diagram of Machinery.

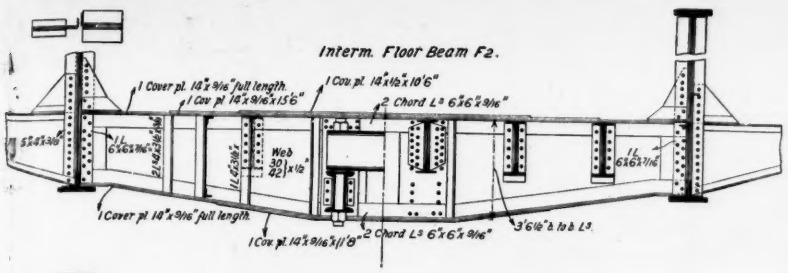


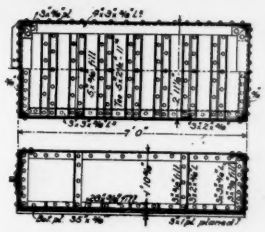
Plan of New and Temporary Bridge.

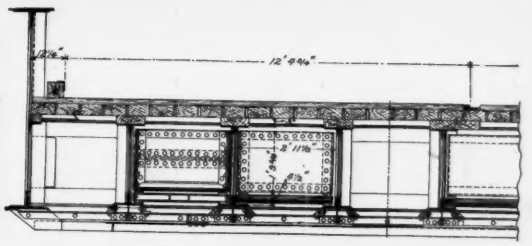


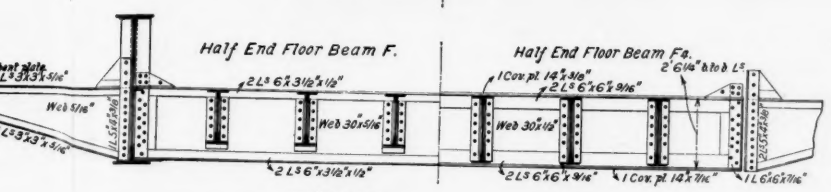
Details of Operating Machinery.

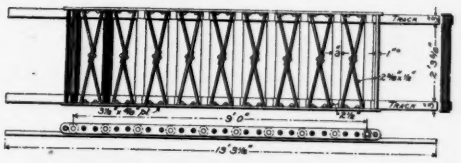
THE NEW DRAWBRIDGE OVER FRANKFO

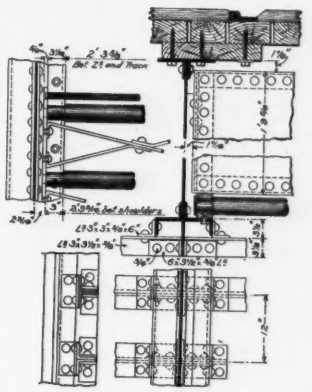

Interm. Floor Beam F2.
1 Cover pl. 14"x 9/16" full length.
1 Cov. pl. 14"x 9/16"x 15'6"
1 Cov. pl. 14"x 11/2"x 10'6"
2 Chord L^s 6"x6"x 9/16"
Web 30 | 22 | x 1/2"
1 Cover pl. 14"x 9/16" full length.
1 Cov. pl. 14"x 9/16"x 11'8"
2 Chord L^s 6"x6"x 9/16"
3'6 1/2" a. to b. L^s

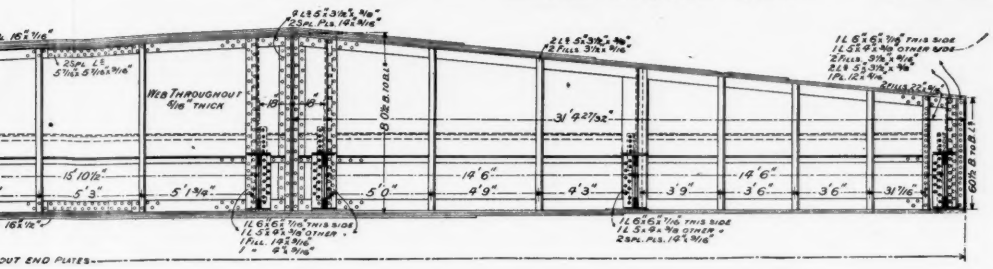






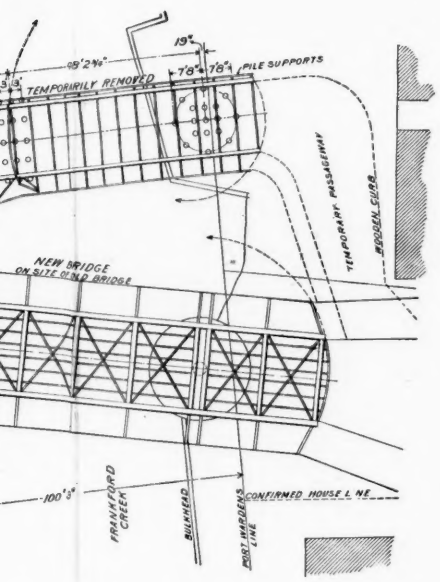




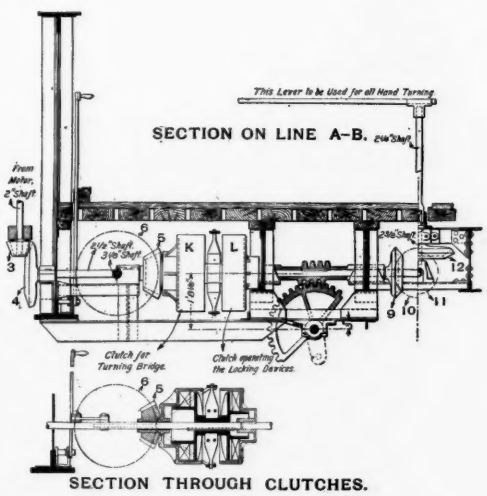


Details of Counter-Balance Carriage.

Superstructure.

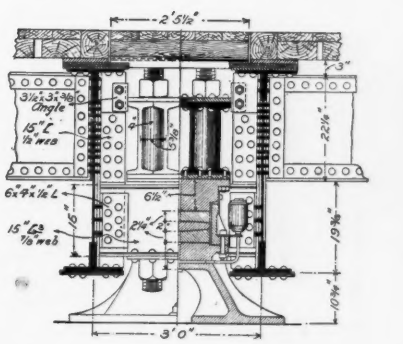


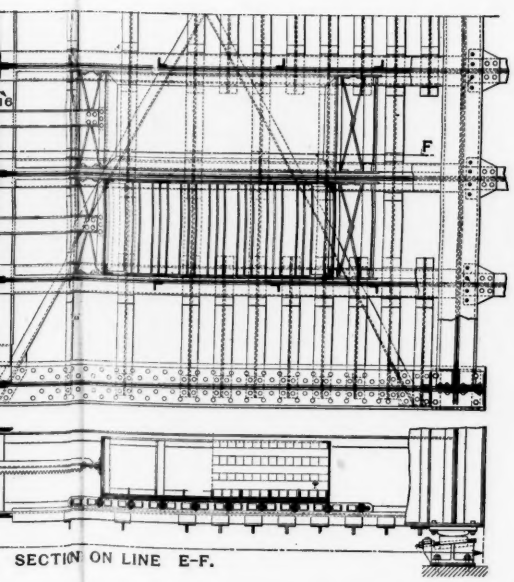
Temporary Bridge.


This Lever to be Used for all Hand Turning
From Motor, 2" Shaft
2 1/2" Shaft
3 1/16" Shaft
2 1/16" Shaft
Clutch for Turning Bridge.
Clutch operating the Locking Devices.

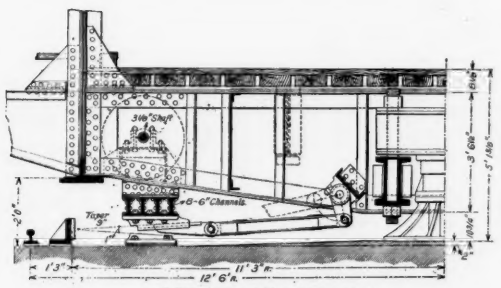
SECTION ON LINE A-B.

SECTION THROUGH CLUTCHES.

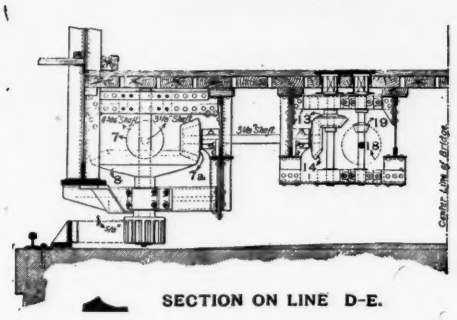




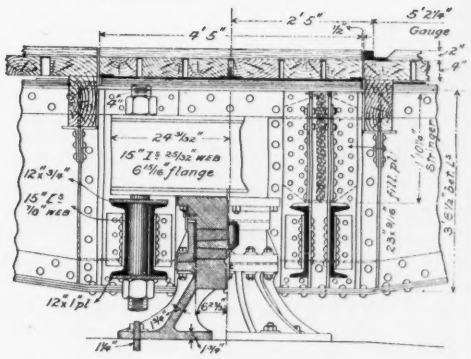
SECTION ON LINE E-F.

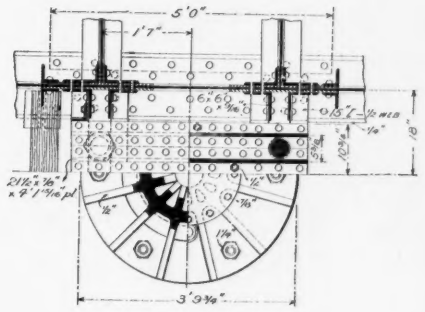


SECTION ON LINE C-E.



SECTION ON LINE D-E.





Pivot Center.

ing to allow the railroads the benefit of any doubts that may exist; as, indeed, any reasonable man would be compelled to do. So the railroads will have several weeks in which to show the benefits of stable freight rates; and as the feeling of the public in regard to these benefits may not be without its influence on the court, it is fair to assume that every road will sustain its representative on the Board of Managers in a rigid adherence to the plan of operations that was laid out when the Association was formed.

Election of Railroad Commissioners by the People.

Mr. Springweiler, of Buffalo, has introduced in the New York Legislature a bill to create an elective railroad commission, abolishing the present Board, but making no other changes of importance. We have not seen a full statement of Mr Springweiler's reasons for advocating this change, but one reason alleged is, we believe, that the present Commissioners are inefficient. It is claimed that the alleged inefficiency is due to the wrong relations of the Commissioners to the railroads, the money for the support of the Commission being collected from the railroads and the Commissioners being, therefore, more friendly than they ought to be to the railroads.

We attach no importance to this point against the present Commissioners—this accusation that they are friendly to the railroads from the natural propensity of the evil heart of man to be friendly to the place that its money comes from. We have never seen a particle of evidence to support it; but a change in the basis of taxation ought to be made. It is as much to the interest of the state to regulate the railroads as it is to the railroads to be regulated, and the Railroad Commissioners ought to be supported from the general fund of the state, the same as the Governor or a Sheriff. To make the railroads bear the expense alone, implies that they have already offended against the laws and deserve punishment for their misdeeds, which is an absurd presumption. Paying for the rod which is to be used to smite you is in this case unequal taxation, and on principle is justifiable only where punishment is deserved; and the fact of desert ought to be formally established.

But it is not necessary to change the Commission in order to effect this reform; the legislature could do it by an act of a dozen lines without otherwise changing the status of the Commission.

Without discussing at this moment the question of the efficiency of the Board as now made up, it is well to inquire on general grounds how much better off should we be if the selection of Commissioners were to be left to the political bosses instead of to the Governor? Theoretically, the voters would do the choosing, and thus get Commissioners more in touch with themselves; but practically, four times out of five, their choosing is a choice of evils. The nominating power, whether it be one boss or a half dozen bosses called "leaders," is quite sure to be less wise than the Governor, because less bound by a sense of responsibility, and it is hampered by the constant condition that it must find a man whose professions will please the multitude.

In elective offices the public service is constantly hampered by the demands of territorial "rights"; a demand which in California goes so far as to require the three Railroad Commissioners always to be selected from three different sections of the state. The same influence is felt, to be sure, in other states, and even by governors, but governors can feel more free to disregard it when that is important. In the matter of Railroad Commissioners it is generally of the highest importance to have a wide field—the whole state—to select from, for the reason that so few men fit for public office have the requisite technical knowledge or the requisite mental habits to deal intelligently with technical subjects which are new to them.

The American people have not yet risen to the point of getting the best talent for Railroad Commissioners—this is shown by the carelessly-drawn laws that the legislatures approve and the meager appropriations that they make for Commissioners' salaries—and the man who selects men for such offices has to hunt for the almost impossible combination of integrity, public spirit, business or technical knowledge and willingness to accept a small salary. With public sentiment as it is, we need all the influences available, in order to keep our railroad commission from sinking to the level of—what they have sometimes been called—flat failures. The most necessary of these conditions at present is that the selection of men shall be made by the most intelligent, responsible and free-willed authority that we have—which is the Governor. It is true that of late years, the Governors of some states have been miserably weak or corrupt, and it is also true, that, in the case of high offices like judgeships, where the Governor was specially wicked and the people became thoroughly aroused, the people (in New York State), did better than their Governor, but this does not impair the general soundness of the rule.

An illustration of the mischievous influence which often appears where public offices are too easily changed by the voters may be found just now in Texas, where the Commissioners are elected by the people. Industrial matters are now uppermost in public discussion in that state; cotton and corn are two of the most important commodities produced, and with both of these the cost of transportation is an important element affecting the selling price; transportation is being daily regulated by a railroad commission which tries to get immediate popularity and takes but a short look ahead. Railroad rates have apparently been discussed so constantly there as to produce a state of feverishness. Texas is in territory an empire of itself, and districts distant from each other often find their conflicting interests very hard to adjust. We do not pretend to be able to form a correct opinion on all these controversies, but our point is illustrated by the following criticism of one section by another, from a recent Texas paper:

> The Dallas freight bureau has served notice upon the Railroad Commission that it has quit said Commission cold. . . . Unless she can get the best of it in the matter of rates Dallas has no use for the Commission. Time and again the Dallas chairman has insisted that all Dallas wanted was to be "equalized." Now, however, since she can't get rates "that do not apply from all other points" Dallas has jumped the game, and that on the eve of a campaign in which the chairman of the Dallas freight bureau will figure as a candidate for Railroad Commissioner. The presumption is, therefore, that the Dallas chairman's candidacy is based upon animosity toward the Commission law as well as toward the Commission itself, since said law specifically prohibits the making of rates which do not operate to the equal advantage of all points. In other words, the Dallas freight bureau is about to transform itself into a political organization for the purpose of dictating, if possible, the selection of a Commission that will give Dallas and its allies every advantage in the matter of freight rates to the detriment of other trade centers throughout the State.

Recent Improvements in Design and Construction of Locomotives.

Much correspondence and conversation have suggested the propriety of stating in a summary way the particulars in which locomotives have been most improved in the last few years. The two articles which follow are designed to sum up briefly the chief facts. They are not intended for the information of those whose business it is to keep themselves most closely informed as to locomotive construction, but for the operating officer in general, who needs accurate information of current progress, and for the younger men of the mechanical departments. In this summary we do not assume to speak with final authority, but merely to bring together the best opinion as far as we are able, and it is quite possible that we shall overlook some important points, and that we may express as accepted practice some points still in dispute.

The most important improvements in locomotives in the last three years have been in boilers, cylinders, pistons, driving wheels, cross-heads, grate area, steam pressure, smokebox apparatus, and tenders.

Boilers.—The heavy work demanded has brought out some important defects in construction and design that have led to changes. The old-fashioned crownbar is no longer used or advised by the best designers. There are several new types of crownbar, which are carried from the wagon top, and are not supported on the edges of the side sheets as heretofore. These crownbars are generally formed of a very heavy tee iron section, and are placed about 3 ft. 4 in. above the crownsheet so as to permit cleaning of the top of the crownsheet. A considerable number of sling stays is used between these crownbars and the wagon top to take the entire load from the steam pressure on the crownsheet. This construction permits the fireboxes to expand, and relieves the side sheets from the load they formerly carried. The sling stays are made much heavier than heretofore, and are attached to the crownbars by large pins turned to a reasonably good fit in the drilled holes in the stays and crownbars. The upper ends of the sling stays are secured by turned pins in drilled holes, two heavy tee irons riveted to the inside of the wagon top.

Builders of locomotives are not recommending Belpaire boilers, for several reasons. The most important is, perhaps, greater weight, for the same power, than other screw stay boilers. The radial stay type is giving satisfaction in security and durability, and as the power of the boiler for a given weight is much higher than the Belpaire type, it is not generally believed that a universal use of the Belpaire type is advisable. Belpaire boilers cost considerably more for the same power than the radial stay type. Some defects have developed in the last two years with the Belpaire boiler under heavy pressures at the point where the cylindrical shell joins the rectangular firebox. The sheets have cracked at this point, owing to the movement of the shell under variations of pressure.

Plain lap joints and single and double riveted have been practically abandoned in boiler construction, except in the firebox and in cases where the joints come between the screw-stays at the sides of the outer firebox. All round-about seams of the joints are double riveted to resist shocks in case of collision, and to prevent leakage from the working of the joints which might arise from the strains produced in switching. The longitudinal seams are almost universally made of the butt type with two welts, one inside and one out. It is essential that the inside welt be shorter than the outside, so that when the joints are caulked on the outside there will be a sheet on the inside of the shell sheet back of the caulking edge. The necessity for this arises from the danger of bad caulking which indents the sheets and makes a starting point for the crack. The principle to be followed is that outside of all caulking edges there should be an extra row of rivets and two thicknesses of sheets. This is accomplished when the outside welt is narrower than the inside welt, and when the caulking is only done on the edges of the outside welt.

All flat surfaces have been abandoned by the best designers, except where the surfaces are stayed by screw stays.

Owing to the greater thickness of the shell sheet, made necessary by the higher pressures, and by the experience which teaches that a heavy sheet is safer and more durable, some important changes have been made in the methods of construction in the boiler shops. Probably the most important is in fitting the sheets together. It has been found that the older practice of drawing the sheets together with bolts and rivets, when two sections do not quite match in fitting up, is impracticable, and that the only practicable method is to fit the sheets with great accuracy, and to make the outer sheet a little scant, so that it has to be heated somewhat before it can be slipped over the inner. This applies more especially to the joints between two sections of the shell. In this way the two sections are shrunk together. Without following this plan it is difficult to get a joint that will remain tight. The best makers ream all holes after the sheets are together. This is done by an electric or pneumatic ro ary reamer which can be handled by one man. With the heavy sheets, unless the holes are reamed, there is no certainty about the fit of the rivets and no security against leakage.

The dimensions of the screw stays for the sides of fireboxes have been changed from $\frac{7}{8}$ in. to 1 in. and $1\frac{1}{4}$ in. in in order to reduce the breakage. This change is not universal, but has been made by some large roads to reduce the trouble from broken staybolts. An important point about the insertion of staybolts is that they should not fit too tightly in the sheets. It is better that they be put in a little loose than too tight; otherwise the hard steel sheets indent the staybolts at the bottoms of the threads and induce cracks, increasing the number of breakages. It is better that the bottom of the thread on the staybolt should be round, and that the joint to prevent leakage be made on the top of the threads on the staybolt rather than on top of the threads in the sheet. Drilling stay bolts to permit steam to escape and give evidence, by leakage of broken staybolts, is a practice almost universally followed.

The old-fashioned plan of dome construction, in which the bottom of the dome sheets are flanged outward to rest upon the boiler, and in which the boiler is flanged upward into the dome, has been abandoned. Instead, there is a flanged angle iron ring, about 1 in. thick, which is riveted to the dome and to the boiler shell, forming a seat or saddle for the dome. In this way there is no flange on the boiler sheet and none on the dome sheet, which is very desirable in view of the fact that these sheets when flanged are so unwieldy that they cannot be properly annealed. Furthermore, the dome connection to the shell is a very important matter, and has been in the past a source of weakness. In the improved construction, the ring which forms the seat of the dome can be made much thicker than the shell sheets. This adds stiffness as well as strength. Stiffness is a very desirable quality in boilers, for any considerable change of form under pressure will in the end lead to cracks.

There has been a tendency of late to use smaller, instead of larger, flues; and many who formerly used $2\frac{1}{4}$-in. flues are now returning to 2 in., and, in some cases, $1\frac{3}{4}$ in. It is not known definitely which is the more economical size, but it probable that the flues ought not to be larger than 2 in. in diameter. If smaller than 2 in., there may be some trouble in keeping them clean. It is pretty well shown that with the heavy draught now necessary on locomotive boilers to make the required amount of steam, a long flue is more economical than a short one. Probably a 14-ft. flue is somewhat more economical than a 12-ft.

If the flues are as long as 16 ft. it is anticipated there will be trouble in getting sufficient draught, owing to the increased friction of the gases in the tubes. Some important experiments made in France, to determine the facts, relating to the effect of the length of tube on efficiency of boilers, show conclusively that the long tubes, even up to 20 ft., give a better efficiency, but the increased length reduces the capacity of the boiler considerably by decreasing the effect of the blast. This decrease came from the friction of the gases in the tubes.

The use of the combustion chamber to reduce the length of the flues and extend the firebox has some theoretical points of advantage, but there has not been enough experience with it to say that it does not carry with it some incidental troubles in the joints of the firebox. If the sheet forming the combustion chamber could be made all in one piece, and welded together to form an internal cylinder without laps, no doubt these troubles would be removed.

The most important of all the changes in dimensions of boilers is probably the change in the firebox area in proportion to the work and service required. The small, deep fireboxes formerly used, in which the firebox was dropped between the axle and frames, are no longer adequate. The rate of combustion reaches frequently 220 lbs. per square foot of grate per hour. This is a higher rate of combustion than is used in any class of boiler, not even excepting steam fire engines and torpedo boats, and is beyond a reasonable limit. Inasmuch as one must expect that locomotive boilers will be crowded, owing to the limit that is placed upon the dimensions and the weight, it must be accepted that the rate of combustion will be very high; but there is a limit which must not be exceeded. Just what is this limit is not yet determined. Officers of the Baldwin Locomotive Works have made many experiments in this matter, and say that the rate should not be higher than 100 lbs. per square foot of grate per hour, but it is probable that the rate can frequently reach 150 lbs. without serious loss in efficiency. The rate for stationary boilers ranges from 15 to 25 lbs. per square foot of grate per hour, and seldom exceeds that amount. This is one reason why locomotive boilers cannot be as economical as stationary boilers.

In speaking of the rate of combustion of locomotive boilers, one must add that more or less of the fuel which is shoveled into the fireboxes is not burned but goes out of the stack unconsumed. In a stationary boiler most of the fuel is completely consumed when the rate of combustion is not above 25 lbs. per square foot of grate per hour, yet when the fires are forced so that the rate reaches 200 lbs., much of the fuel is unconsumed, and a better term to use to describe the combustion in locomotive boilers is "rate of fuel feed." That is to say, the fuel is fed, but not consumed.

It is evident from a great many experiments that the larger the grate on a locomotive boiler the better, as the temperature of the fireboxes is lower, the danger of burning and cracking firebox sheet is less, and the efficiency is higher.

There is a physical limit to the increase of grate area, which cannot be passed. The extreme length of grate which can be fired properly by the average fireman is about 10 ft. With hard coal, or anthracite, firemen can frequently take care of a grate 11 ft. long. No matter how wide the firebox is the fireman can properly care for it. In cases of extreme width, such as in the Wootten boiler, two fire doors are provided, so that the grate can be properly covered. The Wootten box is as wide as can be used within the extreme limits of width of the locomotive, and requires some decided changes in design of the locomotive. Whether it pays to use a Wootten box depends very much upon the class of fuel that is available. With so large a grate a fine fuel is better than coarse, and is generally cheaper. There is no question about the safety of a Wootten boiler, or about its efficiency, and it is undoubtedly the best to use where a sufficient quantity of cheap, fine fuel can be purchased at a low cost. The value of a Wootten boiler can be summed up in the statement that it will burn a class of fuel that the ordinary boiler cannot use.

Intermediate between the small, deep firebox and the Wootten firebox there are many sizes in common use. It is undoubtedly the best construction to place the firebox on top of the frame, in order to get all the width that can be given between the flanges on the wheels. It is considered to be a better practice to drop the frames down back of the driving wheels so as to give a little deeper firebox in front under the tubes, and prevent clogging of the tubes, and decrease the leakage of the tubes that is caused by excessive heat. This style of frame is known as the Mill-holland.

Two extremes of firebox area are now found running out of Chicago. These examples are worth close attention. The Schenectady Locomotive Works have built for the Chicago & Northwestern an 8-wheel locomotive (four drivers) with a comparatively small grate area, but with four 3-in. tubes in the firebox on which the firebrick is carried. The Baldwin Locomotive Works have built for the Chicago, Burlington & Quincy an engine with four drivers, of the Columbia type, having a very large grate and a combustion chamber with a firebrick arch. The service which these locomotives have to perform is similar in kind, but it is not known now which has the heavier train. They are in fast mail service, and the experience of the next few months will settle pretty definitely the relative values of the large and small grates for heavy work. One advantage which accrues to the boiler with the large grate is that there is also a larger firebox heating surface. Each square foot of area of heating surface in the firebox is as good as from 8 to 12 sq. ft. of heating surface in the tubes.

(To be Concluded.)

The Anthracite Coal Agreement.

The anthracite producers' co-operative agreement, that has been talked of for a year, was consummated Jan. 30, as a result of two meetings of the presidents of the 11 interests involved. The apportionment of percentages and the main facts are reported in another column. The question of prices was left largely to the sales agents. It is expected that if the companies keep within their allotment, the question of prices will take care of itself. It is understood that while each of the interests will be held very rigidly to account in the matter of production, slight concessions in prices will not receive much notice. It is believed that by fixing the limit for each month's operations at a figure about equal to the expected demand, there will be no incentive for underselling. It is hoped that the pernicious practice of contracting ahead has been abolished. Heretofore, 30 to 60 day orders have been taken and had to be filled at the market rate if the price went up, while the contract could not be enforced if it went down. This left the trade at the mercy of the middlemen.

A Board of Control will maintain close watch upon all interests and apply prompt corrective measures in case any irregularities appear. A bureau of statistics is to be established in New York for the receipt and tabulation of daily and weekly returns. Every pound of coal that "passes the scales" will be figured. This will put an end to the divergent forms of accounting that, according to report, have been employed to suit the purposes of individual producers. At times it has been the practice to report coal consumed by the locomotives, and at other times to leave it out. Under the new rules coal sold at the breakers for local use will not be included.

The sales agents have decided to limit the output during February to 2,500,000 tons. The output in February, 1895, was 3,133,346 tons. They agreed upon the following prices free on board vessels at New York harbor. These compare with the figures of the November 1, 1895, circular as follows:

	New Prices.	Old Prices.
Broken	$3.25	$3.85
Egg	3.50	4 00
Stove	3.75	4 15
Chestnut	3.50	3 90

While this schedule is 60 cents a ton less on broken and 40 or 50 less on other sizes than the last fixed price list, it is from 20 to 30 cents on domestic, and 30 to 35 cents on steam sizes *more* than prices current earlier in the week.

Every interest is curtailing operations so as not to exceed its allotment; but the new prices are not maintained except on strictly new business. Most of the companies have contracts that will require some little time to clear up. They involve sales to middlemen who in turn can sell to the retailer at less than the companies' new figures. Prices will be unsettled during the greater part of February.

The foregoing is a statement of what has happened since Jan. 30. The troubles of the coal trade, overproduction and low prices date back to the collapse of the McLeod regime, when the Central of New Jersey and the Reading lost heavily and other interests gained. During the two years ending 1893 the loss as compared with 1891 by Reading was 1.64 per cent., of Lehigh Valley 2.36 per cent., and of Jersey Central 1.71 per cent. In 1894 and 1895 Reading tried to make up its loss, and being under no restraint succeeded in doing so; but this stimulated competition that resulted in a supply much greater than the demand, and in December, 1894, when prices ought to have been the highest, they were on a basis of $3.25 for stove coal. At this stage there was considerable talk of the adoption of an agreement for 1895. Several meetings were held, but owing to the excessive and unyielding demands of the Reading, nothing was accomplished. In the spring of 1895 arbitration was proposed, and all but Reading agreed to it; but that company refused to recede from its demand for 21 per cent., and the others threw up the matter in apparent disgust. This deadlock lasted not only up to the meeting of Jan. 30, but apparently until the last hour of it; then the Reading all of a sudden meekly accepted 20½ per cent.

The effect of this agreement upon the future of the trade depends, of course, upon the good faith of the parties. The main object is, of course, to secure a fair price for the product. The returns for 1895 show stove coal to have averaged about $3.05 the year round. This figure is determined by taking the average returns of several of the companies. In 1894 the average was $3.60; in 1893, $4.15, and in 1892 it was $4 10. The output of anthracite has been:

	Tons.		Tons.
1890	35,865,174	1893	43,089,536
1891	40,448,336	1894	41,391,199
1892	41,893,316	1895	46,545,670

The percentage records of previous years compare with the new percentages as follows:*

	1896 allotment.	Change compared with 1895 returns. Inc. or Dec.	Change compared with average 5 yrs. Inc. or Dec.	Output 1895
Phil. & Reading	20.50	D. .97	I. .30	9,905,059
Lehigh Valley	15.65	D. .16	D. .55	7,360,454
Central of N. J.	11.70	I. .14	D. .50	5,388,194
Del., Lacka. & W.	13.35	I. 19	D. 85	6.129,260
Del. & Hudson	9 60	I. .26	I. .20	4,347,843
Pennsylvania R. R.	11.40	I. .61	D. .70	5.025.645
Pennsylvania Coal	4.00	I. .25	D. .10	1.746,832
Erie	4.00	I. .09	I. .70	1,820 088
N. Y., Ont. & West	3.10	I. 04	I. .50	1,424.407
Coxe Bros	3 50	D. .61	I. .50	1,905,784
N. Y., Susq. & W	3.20	I. .18	I. .50	1,492,244
Total				46,545,670

A recent law of the State of New Jersey permits the state to help counties and municipalities to build wagon roads under certain conditions. In the year ending Oct. 31, 1895, the cost to the state for roads thus aided was $100,000, this being one-third of the total expenditure in the building of those roads. About 46 miles of such state-aided roads were completed in the year. In May, 1894, an act was passed providing for the appointment of a State Commissioner of Public Roads having supervision of the state-aided roads. The second annual report of this Commissioner, that for the year ending Oct. 31, 1895, is now before us. Especial mention is made of the disastrous results of the very severe drought of last summer. These results were obvious, as the summer advanced, to every one who had occasion to observe the roads. The Commissioner has urged upon all County Boards the importance of sprinkling wherever it is practicable. He also advises planting shade trees or fruit trees alongside macadamized roads, which would not only add to the beauty of the road and to the comfort of the traveler, but would help very much to avoid the most serious results of protracted drought. Another provision which he considers important is the enforcement of the law calling for broad tires. In the spring of 1893 an act was approved authorizing township committees to rebate taxes for township or road purposes to all owners of wagons having tires of not less than 4 in. in width, but provided that the rebate shall not exceed 50 cents for each wheel in any one year. A year later an act was approved authorizing township committees or other governing bodies of municipalities to require the use of tires up to 4 in. wide on all vehicles carrying 1,500 lbs. or more, used on macadamized streets, under penalty of a fine not exceeding $20 for each offense. We have not heard that this power, placed in the hands of the township committee, has been much used. The first Road Commissioner, in his anxiety to get as many miles of macadam built as possible, approved narrow roads, that is, 10 or 12 ft. wide. The present Commissioner has approved for construction the coming year roads 14 ft. and 16 ft. wide, and nothing less. This he believes to be important, as it tempts the traffic to spread over a larger surface and save ruts. He is of the opinion also that with broader pavement thinner pavement will be found practicable. Applications are now awaiting state aid aggregating 130 miles, and the Commissioner urges a larger appropriation for this purpose. He makes various suggestions as to methods of construction and advocates macadam wherever it is possible. In fact, he has not yet approved of any gravel roads, but will do so where gravel construction is very much cheaper. He makes one suggestion which has attracted considerable attention in the local newspapers, but which seems to be rather novel than practicable. This is that steel plates should be put down for the wheel treads. These would be made of steel "the thickness of ordinary boiler plate." They would be made in troughs 5 in. wide with perpendicular sides half an inch high. He estimates that on these tracks a horse would draw 20 times as much as on a dirt road and five times as much as on a macadam road. He estimates also that this road would cost less than macadam. We fail to see how he could expect to hold his plates in surface or line without stringers and cross ties of some sort, and we suspect that he would find his estimates of cost very much out if he built a road that would endure.

The Railroad Commissioners of Texas have issued an order requiring that "when two or more routes of railroad shall be in operation between shipping point and point of destination, the lowest rate applicable by any one of such routes, shall be adopted by the other routes accepting freight for transportation between such points." In other words, if you are not willing to accept the lowest rate you must not take freight at any price, no matter how much faster time you can make, how much better your facilities for loading and unloading promptly and conveniently, or how willing the shipper may be to pay you a little more than the other road asks. The fact that the shortest and best railroad

* The 1895 average was compiled by the President of one of the large companies for use in connection with a proposition for a settlement and presented at the meeting of Jan. 30.

between two cities generally dictates rates to all the other railroads seems to have completely overcome the Commissioner who wrote this order, and evidently he concluded that it was his mission to fit the theory more closely to the facts! Perhaps it is not to be wondered at that such a temptation to crystallize a beautiful theory into law should be yielded to, but it is rather hard on the better class of railroads to have to refuse money when shippers freely tender it. And, on the other hand, what satisfaction can the slower, roundabout lines get out of this order? The Commissioners ought to realize that what such roads want is not rates as low as the other roads; they must be a trifle lower, so as to offset the disadvantage to the shipper of the greater distance.

It is announced from Savannah that after a conference between the President, the Vice-President and the General Superintendent of the Plant System with the representatives of the locomotive engineers, the recent difficulties between the company and the employees have been amicably settled. The most irritating point at issue was, we believe, the question of a formal contract. The officers of the road were willing to make the pay and regulations about what the employees asked, but would not embody the conditions in a written contract with the Brotherhood. In taking this position they are doing only what is done on many other good roads. The fact that this little discussion has been amicably settled is hardly worth this prominent notice, for, so far as we can see, there has not at any time been any serious likelihood that a strike would result; but we mention the matter for the purpose of calling it to the attention of those daily papers which used large type in the headlines when they announced the rumor that difficulty was impending. Like an aggrieved individual who has been slandered, the railroad company may reasonably demand that a retraction of the scare, which was more or less definitely implied by the headlines, be now published in as prominent a way as was the original libel. We regret to say that this little lapse into sensationalism was observable in some papers which are supposed to be quite conservative.

The United States Export Association has been incorporated in New York and has established headquarters at 143 Chambers street, New York City. Mr. F. B. Thurber, Chairman of the Committee on Foreign Commerce of the New York Chamber of Commerce, is President of the new association. His energy, fertility and business knowledge are too well known to need mention. Mr. Thurber explains that the main object of the association is to encourage the consumption of American products in other countries. The bureau will distribute information gratis. To shippers it will point out the responsibility of buyers and answer inquiries of every nature. To buyers it will show what the best products are, the best manufacturers, commission merchants, insurance companies, and it will also attend to any special matter that may be sent in.

The Chicago gossip about sleeping cars on the Atchison, Topeka & Santa Fe was set at rest last week by the announcement that the contract with the Pullman Company will be renewed. It appears that the Pullman contract on some of the lines controlled by the Atchison has still some time to run, and if the cars of the Wagner or any other company were to be put in service on any part of the lines there would be pretty sure to be friction, if not lawsuits. The Atchison people are credited, however, with having made a very advantageous bargain with the Pullman Company. Heretofore the railroad company has paid three cents a mile on all sleeping cars run, but under the new contract the rate will, it is said, be less than two cents a mile, the railroad company furnishing the lubricating oil only. It is said that the new contract will be for a term of 10 years.

NEW PUBLICATIONS.

A Treatise on Civil Engineering. By W. M. Patton, author of "A Practical Treatise on Foundations," formerly Professor of Engineering at the Virginia Military Institute, etc., etc. Large octavo, 1,650 pages. New York: John Wiley & Sons, 1895. Price $7.50.

This is in its scope such a work as Rankine's "Civil Engineering," enlarged and modernized. It treats of nearly all the subjects commonly included under the general head of civil engineering, and having been completed in the year 1895, by a man both theoretically competent and having had a large practical experience, it of necessity contains a vast amount of pertinent and valuable engineering literature, science and data. While the work leans rather to a description of actual practice in the various lines of civil engineering work, it does not wholly ignore theories and mathematical deductions. Neither does the author hesitate to use the calculus when that seems to be the only direct process of deriving results; but on the whole there is a minimum amount of mathematical discussion. While there is very little in this elaborate treatise which would not be found in special works in any engineer's working library, it will be a convenience to many to have all this information brought together within the lids of a single volume. The author has freely followed the leading authorities both by direct and indirect quotation, as of course one would be obliged to do in compiling a work of so wide a scope. While he has not always credited his text to the various authorities, the well-read engineer will usually be able to trace their derivation.

The task of rewriting Rankine's "Civil Engineering" and bringing it down to date, or rather the task of writing a treatise covering the same ground, but describing the practice of to-day, has often been suggested, but usually abandoned as impracticable. The tendency of late has been rather in the direction of more or less exhaustive treatises along special lines and decidedly away from comprehensive works of an encyclopædia character. Mr. Patton has, however, undertaken to perform the task, and he has succeeded in it surprisingly well. Few well-informed civil engineers of to-day would have supposed it possible to put as much of modern theory and practice of the civil engineer in as small a compass as Mr. Patton has succeeded in doing. The work must be regarded, therefore, as a most successful accomplishment of a large and laborious task, for which Mr Patton deserves the cordial gratitude of the entire engineering profession. It would seem that such a work might perhaps be more valuable to, or satisfy a greater demand on the part of, the mining, the mechanical, and the electrical engineers, than on the part of the civil engineers as a class. These latter are apt to have in their libraries and to have studied in the schools, nearly all the special works which, when combined, would cover the ground included in this volume. Having all these special works, they would have no particular use for this encyclopædic compilation. Whereas the engineer whose work lies in a different direction, not having the standard books of reference used by the civil engineer, would probably wish a general synopsis of these, such as can be found in this work by Mr. Patton. It is scarcely possible that the work can be used as a text book in the engineering schools, since it could only be so used when replacing practically all the engineering text books now employed. Probably no professor would undertake to do this. A civil engineer, however, who is moving about, and wishes to reduce his working library to the smallest possible compass, he could not do better than to get and use this work.

Many of the best portions of the engineering works of such standard authors as Rankine, Green, Burr, Trautwine, Searles, Flynn, Baker, Johnson, DuBois, and Merriman will be found here reproduced in an acceptable form and at sufficient length to satisfy the general practitioner. The specialist, however, in any line, would have little use for the book in his own field; but it would serve him well in such collateral fields of practice as he might occasionally need to enter. The author has selected and arranged his matter with great discretion and has in all cases given the latest and best practice to be found in the literature of the subject. There is no doubt a strong tendency amongst engineers to rely less and less on such compilations as are represented by the engineering handbooks, and to go for information to the special works which treat exclusively of the subjects concerning which information is sought. As these special works are usually written by men who are regarded as speaking with authority and from direct personal knowledge of the subject, they are consulted and followed with a feeling of greater confidence than can be had when consulting a compilation which is confessedly to a large extent second-hand information.

When Rankine's "Civil Engineering" was written some 35 years ago, there were no special treatises; now, however, we have such works covering every field of engineering practice. This volume condenses the information to be found in, say, a dozen books, and whether or not there is a great demand for such a work can now be determined. If there is such a demand, this volume should satisfy it; the work probably could not be better done. We trust the author will be duly rewarded for his great labor. If any one wishes a compendium of the theory and practice of civil engineering as it is to-day in America, adequately presented in a single volume, he can find it in this work.

The following are the subjects of the 59 articles or chapters of this work:

Surveying; Railway Reconnoissance, Surveys, and Locations; Location of Simple, Compound, and Reversed Curves; Theory of Maximum Economy in Grades and Curves; Location of Highways and Country Roads; Location of Lines of Communication by Topographical Maps; Resistance to Traction on Highways; City Surveying; Hydrography and Hydrographical Surveying; Building Materials; Stone; Quarrying and Blasting; Artificial Stones; Lime, Cement, Mortar, and Concrete; Other Artificial Stones of Cement Mortar; Metal; Copper, Lead, Zinc, Tin, Alloys; Paints and Varnishes; Structures; Balance or Equilibrium of Forces; Equilibrium and Stability of Frames; Shears and Bending Moments on Girders and Beams; Elasticity and Resistance of Materials; Elasticity and Resistance Determined by Experiment; Strength of Cement, Mortar, Concrete, and Artificial Stones; Cast Iron; Wrought Iron; Steel; Effects of Form of Cross-Section on Strength and Stiffness; Beams and Girders; Moments of Inertia; Shearing Forces; Deflection of Beams; Continuous Beams; Beams of Uniform Strength; Foundations and Foundation-Beds; Ordinary Earthwork; Quarrying and Stone-Cutting; Masonry; Retaining-Walls; Reservoir Walls, Dams, and Weirs; Equilibrium of Chains, Cords, Ribs, and Linear Arches; Construction of Masonry Arches; Tunnels; Sewers; Construction of Highways; City Streets; Framed Structures; Simple Timber and Iron Trusses; Cantilever Beams and Bridges; Solid and Braced Elastic Arches; Formation and Permanent Way; Torsion and Twisting Strains; Rivers and Harbors; Sea-Coast Defenses, Reclamation of Land; Canals; Hydraulics.

Heating and Ventilating Buildings. An elementary treatise. By Rolla C. Carpenter, M. S., C. E., etc., Professor of Experimental Engineering, Cornell University. Octavo, 412 pages; index and illustrations. New York: John Wiley & Sons, 1895.

Professor Carpenter explains in his preface that the object of this book is to give concisely a general idea of the principles and of the methods of construction of systems of heating and ventilation. He has tried to put the reader in possession, not only of general methods of construction, but of details, and of methods of designing and of estimating costs. Finally, he gives numerous useful tables, and a list of books on the subjects, the literature going back as far as 1815.

His first chapter, of 20 pages, is on the nature and properties of heat; and the second chapter, 34 pages, is on the principles of ventilation. A good deal of energy would be saved if designers would make themselves familiar with these two chapters, even if they went no further. But the succeeding chapters, which fill about 300 pages, give a great deal of specific information as to methods and apparatus and make up an excellent hand-book of this important branch of domestic engineering. By this we do not mean that the man who owns this book, or even the man who has mastered its contents, becomes thereby an engineer of heating and ventilation, any more than we would say that Trautwine's "Pocket Book" can make a civil engineer of a man; but we do mean that the book puts into the hands of the man who, by the quality and range of his education, and by the nature of his actual experience, and by his natural gifts is fit to be called an engineer, a body of information that will enable him to practice acceptably as a specialist in heating and ventilating. And, furthermore, the information is so elementary and so plainly put, that the foreman or other mechanic can understand it and can get from it actual help, and not confusion of mind.

The chapters are: Nature and Properties of Heat; Principles of Ventilation; Amount of Heat Required for Warming; Heat Given off from Radiating Surfaces; Pipe and Fittings Used in Steam and Hot-Water Heating; Radiators and Heating Surfaces; Steam Heating Boilers and Hot-Water Heaters; Fittings and Appliances; Methods of Operating; Systems of Piping; Design of Steam and Hot-Water Systems; Heating with Exhaust Steam; Non-Gravity Systems; Heating with Hot Air; Forced Blast Systems of Heating and Ventilating; Heating with Electricity; Temperature Regulators; Specification Proposals and Business Suggestions; Appendix of Tables and Bibliography.

Transactions of the American Society of Mechanical Engineers, Vol. XVI., 1895. New York: Published by the Society, 12 West Thirty-first street.

The volume of the *Transactions* of the American Society of Mechanical Engineers now before us contains the papers and proceedings of the New York meeting of 1894 and the Detroit meeting of 1895. The whole volume, including the index, is 1,210 pages. It would be impracticable to give a list of all the papers, and we shall not attempt to discriminate by selecting any of them for special mention. The reader who is so prudent as to keep the volumes of the *Railroad Gazette* can get a pretty good idea of the contents of this volume of the *Transactions* by reference to our pages at about the dates of the meetings.

TRADE CATALOGUES.

Locomotives.—The Cooke Locomotive & Machine Co., Paterson, N. J., sends us a catalogue of 72 pages, oblong, 6 in. × 9 in., bound in cloth. The catalogue gives a brief account of Mr. John Cooke, the founder of the works, and a historical sketch of the works. Mr. Cooke was born in Montreal in 1824, and went to Paterson as a boy of 15. In 1852 he associated himself with Charles Danforth, John Edwards and Edwin F. Prall in the firm of Danforth, Cooke & Co. He had served his apprenticeship and worked in various capacities with the firm of Rogers, Ketcham & Grosvenor up to the time of establishing his own firm. He was Superintendent of the Rogers works for a number of years. During the seven years that followed the organization of the new firm it turned out over 160 locomotives. In 1865 the concern was incorporated under the name of the Danforth Locomotive & Machine Co. In 1882, a few months after the death of Mr. John Cooke, the name of the concern was changed to the Cooke Locomotive & Machine Company. In 1881 over 100 engines were built, the greatest number built in any one year up to that time. In 1889 the company moved to the new works just completed and equipped in the most modern style. The buildings cover about 14 acres. The works are prepared to build locomotives of any type, pattern or weight, either from the specifications of the railroad company or from specifications prepared at the works.

The catalogue is illustrated with engravings of the shops and of some special tools. It contains a copy of the standard description and specification for engine and tender used by the company. The greater part of the volume is given up to engravings from photographs of numerous engines built by the company, and 15 pages are occupied with tables showing dimensions, weights, etc., of their locomotives of various types, and with tables showing the hauling capacity of these engines at various speeds and on grades up to 150 ft. per mile.

Messrs. Bryan & McKibbin, New York, are general sales agents for the Cooke Company.

Division of Anthracite Coal Production.

The Presidents of the railroads which transport anthracite coal from the mines, at their meeting in New York last week, agreed upon the percentage of the total production which each company should be allowed to sell. These percentages are given below. The committee report says:

The committee have given the matter very full and careful investigation and consideration, and while, in

determining the percentages which they recommend, the question of statistics has been thoroughly and carefully considered, the division herein recommended is not based entirely upon statistical results of the past. Although this division is by no means satisfactory to the committee themselves, as it relates to the interests of the companies they individually represent, it is, nevertheless, believed to be as nearly equitable as can be arrived at by any other method known to the committee. We therefore recommend that for the period commencing Feb. 1, 1896, and ending March 31, 1897, the following percentages shall be adopted:

Philadelphia & Reading	20.50
Lehigh Valley	15.65
Delaware, Lackawanna & Western	13.35
Central Railroad of New Jersey	11.70
Pennsylvania Railroad	11 40
Delaware & Hudson Canal Company	9.60
Erie Railroad	4 00
Pennsylvania Coal Company	4.00
Delaware, Susquehanna & Schuylkill	3.50
New York, Susquehanna & Western	3.20
New York, Ontario & Western	3.10
Total	100.00

It is stated that these percentages were adopted by the companies unanimously, to go into effect Feb. 1 and to continue in force until Jan. 1, 1897, thereafter to be subject to revision on 30 days' notice. The Reading has accepted 20½ per cent. when it has long been demanding 21 per cent. or more. Lackawanna received more than 1 per cent. less than its tonnage in 1894, while the Lehigh Valley, Jersey Central, Delaware & Hudson and Pennsylvania companies were allotted about the same percentages that they had in 1894. The Delaware, Susquehanna & Schuylkill received a considerably smaller share than it had in 1894, and just 1.20 per cent. less than its output last year.

The newspapers state that the tonnage of the different companies in 1895 and 1894 was given at the meeting as follows:

	1895.		1894.		Inc. or Dec.
	Production.	Per ct.	Production.	Per ct	
Phila. & Reading	9,905,159	21.47	8,289,088	26.02	I. 1.45
Lehigh Valley	7,360,454	15.81	6,424,676	15.52	I. .29
Central N. J.	5,388,194	11.57	4,847,885	11.71	D. .14
D., L. & W	6,129,260	13.16	5,997,989	14.49	D. 1.33
Del. & Hudson	4,347,843	9.34	3,997,059	9.65	D. .31
Penn. R. R.	5,025,645	10.79	4,727,575	11.42	D. .63
Penn. Coal	1,746,532	3.75	1,705,197	4.12	D. .37
Erie	1,820,038	3.91	1,669,827	4.03	D. .12
N. Y., Ont. & W.	1,424,407	3 06	1,372,365	3.31	D. .25
D.,S.& S.(Coxe Bros.)	1,965,784	4.11	1,633,368	3.94	I. .17
N. Y.. Susq. & W.	1,492,244	3.02	726,116	1.79	I. 1.23
Total	46,545,679	99.99	41,391,199	100.00	

The presidents of some of the roads thought that the tonnage reported for 1895 was incorrect. The corrected figures for the first six months of 1895 showed the tonnage to have been 1,000,000 in excess of the corresponding period of 1894. The total figures furnished for 1895 would indicate an increase of 4,000,000 tons in the last half of the year over the same period in 1894. It was thought that coal which passed over the two roads might have been counted in the tonnage of both. Also, it was said that some roads included in their tonnage coal burned in their own engines. The figures have been sent to Statistician William W. Ruley for revision, and important changes in them may be made.

After settling the question of division of tonnage, the Presidents designated a standing committee to formulate the agreement and to act as arbitrators. The members of the committee are: President E. B. Thomas, of the Erie; President J. Rogers Maxwell, of the Central of New Jersey; President E. P. Wilbour, of the Lehigh Valley; President Joseph S. Harris, of the Philadelphia & Reading, and President A. Walters, of the Delaware, Susquehanna & Schuylkill.

On Jan. 30 the Philadelphia & Reading suspended operations for two days in 32 collieries, and a general readjustment of time will doubtless be ordered.

Switch Indicators.

Mr. Salmon's paper on this subject, read at the December meeting, and reported in the *Railroad Gazette* of Dec. 20, was the topic for discussion at the regular monthly meeting of the Railway Signaling Club, in Chicago, Jan. 28.

Mr. Miles (M. C.)—There are two questions: First, whether to have audible or visible indicators; second, in regard to the different functions of the indicator as used on the different roads. If the audible were as reliable as the visible indicator, I think it should be used in preference, on account of the greater likelihood of it being observed by the trainmen. But as the failure of the contact of an audible indicator, or the breaking of a wire, would give a false indication, I think the visible are to be preferred.

When the question of using indicators on switches was brought up in connection with block signals, the Michigan Central took the stand that the indicator should not only announce the approach of the train, but should indicate the position of the signal after the switch had been thrown. The first circuit designed for this was complicated and expensive, four wires being required to run to the furthest switch. But another circuit has been designed which only requires two wires to be run beyond the overlap of the block, and with the latter circuit I believe the installation can be put in cheaper than any other system of indication, at least where there are a number of switches that are not close together in the block. Under the plan used on the Chicago & Northwestern, the Illinois Central and at Kansas City, it is necessary to connect the track sections at the switch, and if there are several switches in the block and not close enough together to have the group come in one circuit, the expense of relays and extra batteries is considerable. The circuit put in on the St. Louis, Keokuk & Northwestern (Burlington) I believe is as simple as the new circuit designed for the Michigan Central; they get the same indication from the train in the block as on the Michigan Central; but they do not get the indication of the position of the signal.

It might be said in favor of the C. & N. W. plan that if a train were beyond the switch in a block section, and another train desired to come out between the train that was on the main track and the signal, that the switchman would have an indication of the approach of another train, while on the Michigan Central or the Burlington he would have no such indication; but if there was a signal on the main track beyond the switch, the signal would be at danger, and the approaching train would necessarily be moving under control. With the Michigan Central plan if the switch was thrown and the signal did not go to danger, the switching train could be protected by flag. The Illinois Central plan is lacking, I think, in not having a preliminary indication.

Mr. Elliott (C. M. & St. P.): On the Northwestern the indicator is cleared immediately after the train passes the switch; on the Burlington the indicator does not clear until the train has passed out of the block. Each of these plans mean entirely different usage of the signals for spacing trains. In the first instance, any train in the sidetrack wishing to go out on the main line can proceed immediately, unless by the rules there must be a time interval. In the other case the block system is maintained absolute. With the Burlington plan, supposing a train to have passed on the main line, one on the side track, taking it for granted that there is no train following, opens the switch and goes on on the main line, but the indicator at the switch would be at danger, the signal at the entrance to the block would also be at danger, and no succeeding train could come on. The first train has gone into the block before the coming train has passed the signal. I think the Burlington plan much the safest.

Circuits should be made as simple as possible, and if an added safety precaution is going to require additional circuits, great care should be used in adopting it. If the circuit breaker to be worked by the signal is going to require an additional circuit and relay, I do not think the safety secured is worth the trouble. Circuits ordinarily used in electric signals are fairly safe. We depend on them; yet if the relay armature should stick, the signal would stick at safety; the addition of relays is very objectionable.

Mr. Miles: The circuit of the Michigan Central and that of the Burlington are practically the same, except that the Michigan Central has better protection. When the switches are inside the preliminary of the block, there are simply two wires being used through the overlap, one extra wire for the indicator, one common wire and one other wire for the indicator and the signal That is as simple as the circuits used on the Burlington, and when we go further than the overlap in the block, there is an extra relay in the same circuit as the signal, and that is put in to cover a very small point. The circuit is practically as cheap as the one used on the Burlington, and with one exception, as simple. You get the further protection of knowing when your block is at clear or safety.

Mr. Wilson (Hall Signal Co.): The visual signal works on the correct principle; if anything happens to any of the parts, the indicator shows danger. I think that with the proper devices for connecting the audible signal it can be worked as safely as the visual, and it has some virtues. Although the visual signal is coming into general use, I am not myself quite prepared to lay the bell on the shelf. With your visual signal you are entirely dependent on one man: but with the audible signal the engineer, the brakeman, the fireman and the whole train crew can hear it. The Michigan Central folks say that they want an indicator that will announce the approach of a train when the switch is set for the main track. They are very modest in their request. They want one indicator to play the part of two. In order to do what they require, there must be two separate circuits for that indicator. . . .

In regard to cost, the simpler circuit, the last one that Mr. Miles spoke about, requires only one or two wires and is less costly than that of the Chicago & North Western. To install the North Western system would cost about 20 per cent. more than the last indicator spoken about. (In reply to Mr. Elliott): The additional cost of putting in a set of indicators over the simple block system will vary greatly according to the position or location of the switch with regard to the signal. On an average it will cost somewhere about $90 for each switch. It costs about 15 or 20 per cent. of the cost of installing a signal; but I have recently figured on a switch where it would cost $275 for one indicator.

President Gillingham: When audible indicators were put in on the Illinois Central, just prior to the World's Fair, the intention was to run foreign engines over those tracks. So far as the reliability of the indicators is concerned, I think they are quite as reliable as the signals are, in fact, if any thing, more so. As installed on the Illinois Central the indicators, in 90 per cent. of the circuits, get their battery from the signal. That is, when the signal assumes the danger position the battery is thrown onto the switch indicators, and if the signal is out of order by reason of grounded track or any thing of that sort, the battery is thrown on your indicator and the bell sounds. So far as the experience of the Illinois Central is concerned in the use of audible indicators, I do not hesitate to say that the results are as good as can be expected, and that they are as reliable as any other indicators might be. The objections that Mr. Elliott brings out are theoretical entirely. While it is true that the visual indicators are theoretically correct in the arrangement of the circuits, the actual results obtained by the use of the audible indicators has been quite as good as any other system that might be used.

The President: In 1894 the average signal failures on our road were a fraction over seven per month, and I do not think that we have had that many failures on the bells. I think we have something like 315,000 signal movements monthly. We have 128 signals, so the percentage of failures is very small.

Mr. Basford: In regard to the rule in making up these circuits so that an indicator would go to the clear position immediately after the train had passed the switch, it seems that it is possible to go too far with rules of that kind. No matter how many rules you have requiring the trainmen to wait until a train which has passed a switch has gone out of the block before they throw the switch, men will disregard them at times

The point is well taken that audible signals give their communications to more people and are therefore safer. The time when you want signals most is probably in a blinding snow storm, and if you require men to dig the snow out of the face of the indicator, the probability is that it will not be done, whereas storms bad enough to block up a properly protected bell are infrequent. The criticisms of bells as switch indicators have been made possibly on account of the poor bells which a great many of us have had experience with. I call your attention to the construction of the bell which Mr. Salmon speaks of in his paper; that in my opinion explains the good result on the Illinois Central.

Mr. Wilson: That bell is constructed throughout of the very best material, but the special point is the contact. The coils are specially wound, the contact is made like the brush on a dynamo, only the teeth of the comb or brush are slightly curved in order to bring the right action on the anvil when the hammer of the bell swings back. There are four of these parts to the bell and they make a sliding contact, being curved; when they come back they tend to straighten out and this gives a sliding movement which keeps the points clean and bright.

Texas Car-Interchange Association.

The Texas Joint Car Association, an organization of railroad mechanical officers for the consideration of mechanical questions connected with the interchange of freight cars, held a meeting at Houston, Jan. 21. Mr. Hogsett, Joint Car Inspector at Fort Worth, presented an annual report showing the following statistics of his office for the year:

	1895.	1894.
Total number of cars received	112,413	102,030
" " " " delivered	112,413	102,030
Total cars	224,826	204,060
Cost per car (cents)	5.97	6.29
Cost of labor	$12,577	$10,242
Cost of stationery	551	451
Cost of rent	144	144
Total expenses	13,271	10,831

Various questions concerning details of inspection, similar to those which come before the Arbitration Committee of the Master Car Builder's Association, were discussed at length at the meeting. Among other points decided was that cars with drawbars not standard height must be refused, even when loaded for points within the state of Texas. Several questions presented by the Fort Worth joint inspector were considered and answered. This inspector was instructed to see if he could get the coupler manufacturers to supply small stocks of parts necessary to make repairs with a view to keeping these at headquarters. After the business of the day was finished a permanent organization was effected, to be called the Texas Association for the Interchange of Cars. Regular meetings will be held on the first Mondays of April and September. The President of this Association is Mr. A. S. Grant, of the Houston, East & West Texas.

TECHNICAL.

Manufacturing and Business.

W. H. Wilkinson for the past five years Superintendent of the Peckham Motor, Truck & Wheel Company, at Kingston, N. Y., has accepted a position with the Ball & Wood Co., of Elizabeth, N. J., as general manager.

The Universal Car Seal Company has been organized at St. Louis with a capital stock of $25,000 by Louis Bierman, Adolph Baer, L. A. Brown and Smith W Summers.

Some recent orders of the Westinghouse Electric & Mfg. Co. show to what out-of-the-way places the product of that company is shipped. One order is for the equipment of an electric railroad in the Isle of Man; another order for electric railroad apparatus for the city of Coventry, England; and a third order for electric motors and railroad generators for Capetown, South Africa. The company is also about to ship an order for electric railroad apparatus to Bangkok, Siam.

The Consolidated Cattle Car Co., of Chicago, has acquired control of the equipment of the Hicks Stock Car Co., and Chas. E. Kimball is President of the new company. H. W. Gays, St. Louis, is Vice-President, and C. E. Braden, of Chicago, is Treasurer. The following officers have been placed in charge of the business of the company: B. C. Hicks, Manager; T. A. Whitmore, Traffic Manager; C. E. Braden, Auditor; Joseph Buker, Superintendent.

Hoyle & Abbott, of Atlanta, Ga., have been appointed Sales Agents of the Drexel Manufacturing Co. for the Southern states, and will have charge of all the sales of railroad specialties manufactured by this company in that territory.

The Berlin Iron Bridge Co. has just completed for the Newport News Foundry Co., at Hampton, Va., a large foundry, 40 ft. × 160 ft., the central portion being controlled by a traveling crane.

The Denver Automatic Car Coupler Co. was incorporated at Denver last week, with a capital stock of $100,000, by F. H. Hyatt, H. L. Marsh and L. L. Moe.

The Berlin Iron Bridge Co., has just completed a very successful year with shipments the largest in the history of the company, and representing over $1,000,000 worth of business. At the annual meeting of the stockholders, on Jan. 30, the following directors were elected: C. M. Jarvis, Burr K. Field, G. H. Sage, H. H. Peck, of Waterbury; S. H. Wilcox, of Brooklyn, N. Y., J. W. Burr and F. L. Wilcox. The following officers were elected: President and Chief Engineer, Chas. M. Jarvis, Vice-President, B. K. Field; Secretary, G. H. Sage; Treasurer, F. L. Wilcox; Manager of Highway Bridge Department, D. E. Bradley; Assistant to the President, E. W. Stearns.

The Rand Drill Co. has removed its general offices from 23 Park Place, to the new building of the American Surety Co., at 100 Broadway, New York.

F. M. Pease, dealer in railroad supplies, at 355 Dearborn Street, Chicago, offers for sale the oil tank cars formerly run in the service of the Green Line on the Pennsylvania. The cars are in good running order.

Iron and Steel.

The Standard Malleable Iron Company has been organized at Muskegon, Mich., by the election of the following officers: Geo. H. Kingsley, President; E. L. Howe, Vice

President and General Manager; P. J. Martin, Treasurer, and M. O. Senseny, Secretary.

In the bridge and construction department of the Pennsylvania Steel Company at Steelton, shipment is being made of the material for the second section of the Boston subway comprising about 1,000 tons of structural material, mostly T beams. The company has recently received a contract for 1,500 tons of T rails from the Cumberland Valley Railroad Company.

One of the improvements added to the Edgar Thomson Steel Works, at Braddock, during the recent suspension is a new finishing mill, containing a full set of hot beds and straightening presses.

The building has been completed for the new rod mill of the Illinois Steel Co., at Joliet, and the machinery is now being installed.

The property of the North Carolina Steel & Iron Company, at Greensboro, has been formally transferred to J. M. Worth, Edwin Shaver and associates.

Press reports say that the Cambria Iron Company has decided to shut down its furnaces at Hollidaysburg and Johnstown for one month.

The Minnesota Iron Co., one of the Lake Superior Companies, has closed its option on the Virginia or Moose property, at the townsite of Virginia, and will mine 112,000 tons a year on a lease of 18 cents. The Minnesota company has now under option on the Mesabi range about 13,000 acres of land, supposed to be mineral bearing.

Press reports say that the Sterling Steel Co. is enlarging its plant at McKeesport in order to rapidly fill the large contract for steel projectiles recently secured from the United States Government.

Napier furnace, giving employment to about 700 men, on a branch of the Nashville, Florence & Sheffield road, has just been put in blast, after a shut-down of several months.

The Tennessee Coal, Iron & Railroad Company has shut down temporarily its furnace at Cowan, Tenn.

The Pittsburgh Iron & Steel Manufacturing Company, the new firm which recently purchased the Moorhead & McLean plant, went into the hands of a Receiver Jan. 29. Judge Buffington, in the United States Circuit Court, appointed the Union Trust Company receiver. The latter gave bonds in $50,000. The application was filed by the Vega Iron Company, of Duluth, Minn., which company holds a judgment against the defendant firm. The assets of the company are in excess of their liabilities, and the present embarrassment is the result of large expenditures for improving their plant.

The Bethlehem Iron Company is pushing work on Government contracts. On Jan. 29 four turret top plates for the battle-ship Oregon were shipped to the Union Iron Works at San Francisco.

Suit has been entered in the United States Circuit Court by John Brislin and Antonio Vinnac against the Carnegie Steel Company, Limited, for $100,000 damages. The plaintiffs are inventors of a feed mechanism for rolling mills and allege that the defendants now have four of these devices in use and that they refuse to pay for their use. A suit for the same amount has also been brought against Jones & Laughlin's American Iron Works, where four similar devices are in use.

New Stations and Shops.

The proposed new station buildings at Greensboro, Durham, Selma, N. C., and some other stations on the Southern Railway's new route to Norfolk, Va., will probably be built now very soon, as the suit to annul the lease of the North Carolina Railroad (on which these stations are located) to the Southern has been withdrawn.

Work began last week on the new depot of the Carolina Central (Seaboard Air Line system) at Charlotte, N. C.

During the past week there have been more men employed in and about the Cincinnati Southern shops at Chattanooga than ever before. A new turntable is being put in, and within the shops over 200 men are at work. A turntable and other improvements are being added at Harriman, Tenn., requiring a large number of men.

The New York Central Railroad is to build a one-story freight house, at Buffalo, on the south side of Carroll street, between Michigan and Chicago streets. The frontage will be 50 ft. × 880 ft. William J. Gillett, of Syracuse, has the contract for erecting the building.

Interlocking.

The National Switch and Signal Company, of Easton, Pa., has the contract for furnishing a 64-lever switch and signal machine for the New York, New Haven & Hartford at Hartford, Conn. Each signal will be operated by an independent lever, no selectors being used. The National has also received an order for a 24-lever machine for the Lehigh Valley at South Easton; and one for a 16-lever machine for the Cleveland, Cincinnati, Chicago & St. Louis at Franklin Junction, O. This last named plant will be equipped with Hansel's electric locking, "so that a home signal cannot be changed after a train passes the distant signal."

Lidgerwood Cableways for the Panama Canal.

Spencer Miller, M. E., engineer of the department of hoisting and conveying machinery of the Lidgerwood Manufacturing Company, New York City, who recently went abroad in the interests of that company, has just closed a contract with the Compagnie Nouvelle du Canal de Panama at Paris, for seven Lidgerwood cableways to be used on the Panama Canal. This is the company recently formed to complete the Panama Canal, and the seven cableways will be used exclusively for earth excavating. They will be equipped with all the latest improvements, including the patent aerial dump which is an important feature, the apparatus throughout being similar in construction to the 20 Lidgerwood cableways used in the Chicago main drainage canal, except that the Panama cableways will have fixed towers and anchorages. The spans will range from 250 to 300 ft.

Engineers were sent by the Compagnie Nouvelle du Canal de Panama from Paris to examine the Lidgerwood cableways and other excavating machinery in use at Chicago on the canal there building.

Oil Burning Locomotives.

The Wheeling & Elm Grove, a line from Wheeling to Elm Grove, W. Va., 10 miles, is now using oil as fuel in two of its engines in place of coke. The engines have been running three weeks, burning oil, and work well. The question of changing the road to an electric line was discussed by the management, but it was decided that with oil fuel it would be cheaper to use steam and more convenient.

Tie Plates.

Mr. A. Morrison, a well-known and prominent roadmaster on the Lehigh Valley Railroad, has accepted the position of Consulting Engineer with Messrs. Dilworth, Porter & Co., of Pittsburgh; his duties with that firm having begun Feb. 1. Mr. Morrison's especial work will be in pushing the use of the Goldie tie plate. We are informed that the growth of that business has been so great as to make it impossible for Mr. Goldie, active and efficient as he is, to do justice to either the firm or its patrons. Mr. Morrison carries to the work a high reputation as a trackman, and has a great acquaintance with men in all branches of the maintenance-of-way department. Messrs. Dilworth, Porter & Co. have largely increased their facilities for the manufacture of tie plates.

The Alexander Nut Lock.

The nut lock herewith illustrated was recently patented by the Alexander Nut Lock Co., 80 Broadway, New York City. It has the merits of the former patent,

shown in our issue of July 6, 1894, and has been improved. The ends, which project beyond the nuts, are slightly twisted, so that the inner corners are higher than the outer, forming inclined planes. When the nuts pass over these planes they are locked. The Alexander nut lock is a positive lock and a spring washer, with the further advantage of being simple; it also has the several advantages that are claimed for all double nut locks. These nut locks are made for the Alexander Nut Lock Co. by the Washburn & Moen Manufacturing Co., Worcester, Mass., who have just completed a machine for turning out the various sizes required.

The St. Paul Floated.

The American line steamship St. Paul, which, as we noted last week, was recently stranded on the New Jersey coast off Long Branch, has been successfully floated, after lying on the beach for 10 days. On Feb. 4 a high northeast wind rolled up sufficient water to partially float the vessel and she was hauled off into deep water by four tugs and her own steam winches.

Awards to the Westinghouse Electric Company.

The following is a list of the awards made to the Westinghouse Electric and Manufacturing Company at the Atlanta Exposition:

Silver medal for exhibit of Wurts non-arcing lightning arresters.

Gold medal for an exhibit of induction motors and dynamos illustrating the two-phase alternating system for the transmission of power.

Silver medal for an exhibit of an electric street railroad system.

Silver medal for an exhibit of Shallenberger electric meters.

Honorable mention for an exhibit of high tension fuse blocks and systems.

Gold medal for an exhibit of photographs, plans and description of the two-phase generators recently installed at Niagara Falls.

Coupler Patent Suits.

Judge Edward T. Green of the United States District Court handed down a decision at Trenton, N. J., on Jan. 31, granting a preliminary injunction against the Smillie Car Coupler & Mfg. Co. in a suit brought by the Gould Coupler Co.

New Elevator at Brooklyn.

A grain elevator with a capacity of 2,000,000 bushels is to be built at Forty-second street, Brooklyn, N. Y., by the Bush Grain Elevator Company. This is on the east side of New York Harbor, and the same concern has several large warehouses at the same pier.

Chicago Main Drainage Canal.

At a meeting of the Board of Trustees of the Sanitary District, Jan. 30, the dismissal of 36 members of the engineering department was ordered. This order is to take effect immediately, and it is expected that a further cut in the force will follow. This action was taken on the suggestion of the Engineering Committee, who submitted a list of names of those to be dismissed. Those affected by this reduction hold positions from assistant engineer to messenger boy. In the report of the Engineering Committee suggestions were made for the reorganization of that department, a staff of 84 employees being recommended. Reorganization of the Construction Department was also recommended, the assignment of all the employees being left to the Chief Engineer.

Ordnance Notes.

The United States Projectile Company, of which E. W. Bliss is President, has received an order for 4,400 semi-armor-piercing projectiles, weighing about 300 lbs. each. The contract price is $27.25 per shell. This makes the entire contract worth $119,900. The shells will be manufactured of open-hearth steel, furnished by the Midvale Steel Company. They are for use on United States war ships.

Tests of the Crozier wire-wound, 10 in. breech-loading rifle have been made during the past year, as opportunity afforded. About 231 rounds have been fired. Thus far the gun has stood the trials well. The bore shows the ordinary erosion due to long-continued firing, but no weakness has been developed in the structure of the weapon.

The eight-inch Haskell multi-charge gun is finished, and a mount has been made for it so that it can be fired from a proof-carriage.

The Government now has a contract with the Bethlehem Iron Company for 25 eight-inch rifles, 50 ten-inch rifles and 25 twelve-inch rifles. Of these, 10 eight-inch guns are practically completed, 14 ten-inch guns are assembled, and nearly all the forgings for 10 twelve-inch guns are finished.

THE SCRAP HEAP.

Notes.

The city of Buffalo has advertised for bids for $171,000 registered bonds to carry out the grade crossing improvements in that city.

The Commissioners of the District of Columbia are trying to get a bill through Congress forbidding the establishment of highway grade crossings of railroads in the District after the year 1899.

On Feb. 1 some of the employees of the Chicago & Southeastern struck for back pay, and on the following day (Sunday) a number of cabooses and a station building and other property of the company were destroyed by incendiary fires.

Under the new salary reduction law of South Carolina just passed by the legislature of that state, the salary of the Railroad Commissioners is reduced to $1,700 a year each. The change, however, in their case does not go into effect until Jan. 1, 1897.

Severe storms occurred in Mississippi and Texas the latter part of last week. The Illinois Central was submerged near Canton, Miss., and "many bridges were destroyed," but it does not appear whether these were railroad or highway bridges. The loss of bridges is reported from numerous other places in Mississippi. Near Houston, Tex., the Missouri, Kansas & Texas track was badly damaged.

The problem of abolishing highway grade crossings in the city of Newark, N. J., has been held in abeyance several years on account of the necessity of making three grades, one for the streets, one for the Pennsylvania Railroad, and a third, above both these, for the Central of New Jersey. The Pennsylvania tracks are now at the street level and the Central crosses on a bridge above them. There is now an indication that something may be done, the city having appointed Mr. F. P. Dollar as a special consulting engineer to deal with the crossing problem.

Near Keystone, W. Va., on the night of Jan. 27, a drunken negro who objected to paying his fare on a train of the Norfolk & Western, became enraged and fired a number of pistol shots promiscuously among the passengers. One passenger was killed and two others injured, one fatally. A few hours later the negro was being taken to jail on another train when the train was stopped, about a mile from a station, by a mob of 100 armed men; the mob forced the officers to give up the prisoner and then hung him to a tree and riddled the body with bullets.

The Philadelphia & Reading has laid off a large number of men at the Palo Alto and other car shops, and freight trainmen have also been temporarily suspended for lack of work. This is in consequence of the company's agreement to restrict the production of coal. The Atchison, Topeka & Santa Fe has ordered a shutting down or serious shortening of working hours at some of its important shops, the object being, it is said, to keep the expenses for the month of January within a certain limit. Paying as you go is not always so nice as to have a receivership.

The Philadelphia *Public Ledger* says that the new bituminous coal combination, which has been talked of for some time, is getting into shape and is expected to go into operation before April 1 next. There is to be a general selling agency for each one of the six soft coal districts shipping to tidewater. Each agency will control the production and make sales to be equitably divided among the operators on their respective railroads. The districts will be divided as follows: No. 1, Clearfield and other adjacent mines, shipping via the Pennsylvania Railroad; No. 2, Cumberland, Myersdale and all shippers via the Baltimore & Ohio; No. 3, Norfolk & Western (Pocahontas); No. 4, Chesapeake & Ohio; No. 5, Beech Creek and Reynoldsville regions, and No. 6, West Virginia Central Railroad.

Saratoga Hotels.

Those of the M. C. B. and M. M. Associations who have in previous years enjoyed the hospitality of the Grand Union Hotel at Saratoga will doubtless be glad to learn

that the proprietors of that hotel, Messrs. Woolley & Gerrans, have decided to open it on June 15, so as to be in time for the June conventions. The special rates to the two above named associations will be $4 a day single rooms and $5 for room and bath. Those who remember the rather doubtful pleasure of dressing for the grand ball at Alexandria Bay, last summer, by the light of a candle stuck in a bottle, will no doubt feel that going back to Saratoga will be a return to civilization.

A Trolley Parlor Car Excursion.

On Friday, Jan. 31, the Brooklyn Heights Railroad Co., placed at the disposal of the *Railroad Gazette* its new parlor car "Amphion," a description of which was printed in our issue of Jan. 24. A party was made up and the car was run over the tracks of the company as far as Ulmer Park, returning by way of Court street. The excursion was under the charge of Mr. C. E. Harmon, Superintendent of the road. It was the intention of Col. T. S. Williams, Secretary and Treasurer of the road, to accompany the party, but he was prevented from doing so by business engagements. These new cars have been built especially to be chartered by parties for theaters, weddings, receptions, etc., and will probably be especially used by those living in the suburbs of the city. For the exclusive use of the car during a morning or afternoon the company charges $20, and during an evening $25. For theaters, receptions, etc., to which passengers are taken and afterwards called for when they desire to return the charge is $ 5. Each car seats 20 persons and the decorations and furnishings are on a par with those usually found in steam railroad parlor cars. Buffets are provided for serving luncheons, and the cars are heated and lighted by electricity and are served by a porter.

A Southern Waterway Project.

An old project to unite the waters of the Tennessee River and those of the Warrior and Coosa rivers by a canal has been recently revived The movement was briefly discussed in Chat anooga last year during a visit of the Commercial Club of St. Souis, and now the Mayor of Birmingham, Ala., has addressed letters to a large number of prominent business men, representatives, engineers and others, asking for any information they may have looking to an estimate of the feasibility, cost, etc., of such an undertaking. It has been suggested that the convict labor of Alabama be employed on the construction of the canal, and that Congress be asked to give aid. It would appear that the people of Alabama and Southern Tennessee are taking an active interest in it.

Brown's Discipline on the Chicago, Peoria & St. Louis.

Mr. C. H. Bosworth, General Manager of the above-named road has issued a circular to employees announcing that "on Feb. 1, or as soon thereafter as arrangements can be made to put the scheme in operation, there will be adopted on this line what is known as the 'Brown System of Discipline.'

"*The System*.—Instead of discharging or suspending without pay for infraction of the rules of the company, a record will be kept of the mistakes and faults of employees. In this record will be kept a brief statement of the irregularities for which a man is responsible. This record will take the place of the 'lay off.' When a man commences to make a record in the book, he will be called in for an interview. He will be reminded that if the record gets too long, the company will have to consider him as unfit for the service; he will be shown his failures, and will be given an opportunity to improve. When the record against a man gets so long as to demonstrate his unfitness for the service, he will be dismissed. This record will be a private one, and no employee will be shown any record therein except his own.

"*Bulletins*.—In addition to the foregoing record, and for the purpose of making every accident and incident of importance happening on the road a lesson to all trainmen, there will be posted up on the bulletin boards brief statements of accidents, mistakes and failure to observe the rules, with comments thereon by the proper official. No names will be mentioned on these bulletins. It is hoped that the examination of these notices will be instructive to the employees, and do much to prevent the recurrence of similar cases.

"*Conclusion*.—It is confidently believed that with this system in effect, a feeling of more security and confidence on the part of employees will be developed, and that the good men will be benefited and encouraged, while the unworthy, if there are any such, will be eliminated. It must be understood that co-operation on the part of employees in the matter of this reform will be of great assistance in producing good results, and that to this end, it is very desirable that exactly correct accounts of mishaps occurring on the road shall be furnished by the parties interested. It must be understood that the right to summarily discharge for serious offenses is not given up on the adoption of this plan The record of the present employees up to date will not be entirely ignored, but it will be put in the back-ground to the extent of giving everbody a new start on the date this change goes into effect."

The Westinghouse-Baldwin Electric Locomotive.

The Westinghouse Electric & Mfg Co has begun equipping the Turtle Creek Valley branch of the Pennsylvania Railroad with an overhead trolley wire to test Westinghouse-Baldwin electric locomotive. This railroad runs from Brinton to Murraysville, Pa., and is about 11 miles long. The new locomotive has been completed at the Baldwin works, Philadelphia.

Water-borne Coal to Mobile.

The first tow of coal from the Warrior coal fields of Alabama passed through the new government locks above Tuscaloosa Jan. 27, and in its passage down the Warrior, the Tombigbee and Mobile rivers to Mobile it had a great reception.

Houses For Prussian Railroad Employees.

The Prussian Government has asked for a vote of credit of 5,000,000 marks for building houses for employees of the state railroads. This will permit the building of 3,300 new houses divided into three classes. Twelve hundred of these will have two rooms and a kitchen and 400 will have but one room and a kitchen. We do not learn what it is proposed that the other 1,700 buildings shall be.

LOCOMOTIVE BUILDING.

The Lehigh Valley will shortly order five heavy freight engines.

The Wheeling & Lake Erie road has placed an order for 10 freight locomotives with the Cooke Locomotive Works.

The Cincinnati, Jackson & Mackinaw will shortly give out orders for a few locomotives. The engines to be ordered will be freight, but the number to be built is not yet decided upon. It will probably be not over five.

The Pennsylvania road has just issued orders for the construction of 38 new locomotives at the Altoona and Juniata shops. Six class "U" switch engines and 12 class M heavy shifting engines will be built at the Altoona shops, and eight class "L" heavy fast passenger engines and 12 new compound moguls will be built at the Juniata shops. A number of the shifting engines and moguls will be for lines west of Pittsburgh, and five of the new class L engines will be for the Panhandle.

The 10 mogul locomotives recently ordered by the Illinois Central from the Brooks Locomotive Works will be duplicates of the 14 engines built by the same works for the railroad last fall The engines will have 19 in. × 26 in. cylinders, Belpaire boilers 62 in. in diameter, driving wheels 56 in. in diameter and long fireboxes. The total weight of the engine will be about 125,000 lbs. The Brooks Works are also building for the Lake Erie & Western six 18 in. × 24 in. moguls, with wagon-top boilers 58 in. in diameter, driving wheels 56 in. in diameter; total weight of engine about 110,000 lbs. The three engines building for the Buffalo Creek are six-wheel switching locomotives to weigh about 115,000 lbs. These engines will have 20 in. × 24 in. cylinders, wide firebox on top of frame, driving wheels 50 in. in diameter, radial stayed straight-top boilers 60 in in diameter.

CAR BUILDING.

The Barney & Smith Manufacturing Co., of Dayton, O., has an order from C. J. Hamlin, of Buffalo, to build a private car for the transportation of racehorses This car will be 62 ft. long and will have six-wheeled trucks and steel-tired wheels. Plans and specifications for the car were prepared by the Union Car Company, of Depew, N. Y.

BRIDGE BUILDING.

Allegheny, Pa.—Preparations are being made for the proposed raising of the Woods Run bridge on California avenue. The bridge will be raised about 18 ft. and the cost will be borne by the city.

Atlanta, Ga.—A meeting of the Bridge Committee of the City Council was held Jan. 30. Plans for the Jones avenue bridge were presented by the City Engineer, together with two estimates of cost. One plan cost about $1,200, the other, for a heavier structure, about $1,700. The latter plan was adopted. Of the $1,700 the Southern Railroad has agreed to pay $500, and the Western & Atlantic a like amount.

Bowling Green, O.—The Wrought Iron Bridge Co., of Canton, O., has been awarded the contract for a bridge across the Portage River near Mermill.

Buffalo, N. Y.—Bids were recently opened for a temporary foot bridge over the depressed grade crossing on Franklin street The bid of $850 from the Buffalo Bridge Company will probably be accepted. It will be some weeks before bids will be asked for the permanent bridge.

Burlington, Kan.—At the opening of bids on Jan. 13 for an 80-ft. steel bridge at this place the bid of the Kansas City Bridge Co., of Kansas City, Mo., $1,800, was found to be the lowest. We have not yet received news of the award of the contract.

Caldwell, Tex.—Bids will be received until Feb 12 for two iron highway bridges, each 50 ft. long, with a 14-ft. roadway. Address T. M. Hunt, County Judge.

Chatham, Ont.—The City Council will apply to Parliament to declare MacGregor Creek non-navigable and to erect a permanent bridge over it.

Chattanooga, Tenn.—A new bridge is to be built by the bridge committee of Hamilton County, Tennessee, over Chattanooga Creek. It will be used by the Chattanooga Electric Street Railway and the public, and is on the only thoroughfare between Chattanooga and Lookout Mountain.

Cincinnati, O.—Bids were opened on Jan. 25 by the County Commissions for the bridge over Dry Fork. We have as yet received no news of the award of the contract.

Delair, N. J.—The completion of the new Pennsylvania Railroad bridge over the Delaware at this place has been delayed by the trial fixing the damages for the Hatch property taken by the railroad for the bridge approach. This is the second trial, and the non-agreement of the jury will make a third trial necessary. The laws of New Jersey provide that the land cannot be taken until the question of damages has been definitely settled.

Detroit, Mich.—Representative Corliss has been requested to introduce a bill into Congress for the erection of a bridge from Grosse Point to Belle Isle.

DuBois, Pa.—A new iron bridge will probably soon be built over Pentz Run. T. W. Moore, of Curwensville, and G. W. Hall, of Clearfield, are interested.

Grand Rapids, Mich.—The Council has been discussing for some time the necessity of a bridge over Grand River at Butterworth avenue. The building of the proposed bridge is favorably regarded, and the Board of Public Works has been asked to estimate the cost of a 400-ft. bridge.

Guernsey County, O.—The contracts for the foundation of two bridges, one at Phillips and the other at Senecaville, have been let respectively to George McFee, of Indian Camp, O., and to Gaston, Harper & Secrest, of Senecaville The superstructures for these two bridges have not yet been contracted for.

Hamilton, O.—There is some talk of building a bridge over Four Mile Creek, near Darrtown, at an estimated cost of $10,000.

Harwinton, Conn.—The bridge at Torrington, near this place, which was recently destroyed, will probably be replaced by an iron structure. The question will be decided at the next meeting of the selectmen.

Indianapolis, Ind.—The old project of constructing a viaduct across the railroad tracks on the West Side is again being agitated. The latest idea is to build the viaduct on West street, making the north entrance at Maryland street and the south beyond South street. This plan is thought to have many advantages over that to build the viaduct on Kentucky avenue.

Jersey City, N. J.—The Pennsylvania Railroad has, through General Superintendent, F. Walcott Jackson, issued a notice that it will repair the bridges over the Hackensack and Passaic Rivers, and that navigation will be obstructed for 20 days, beginning Feb. 1.

Johnstown, N. Y.—A new iron bridge will probably be built at Townsend avenue, and proposals for the same have been authorized.

Kansas City, Kan.—Plans and specifications for a new steel bridge across the Kaw River at Central avenue have been prepared by the engineer of the Metropolitan Street Railway Company and submitted to City Engineer Ellis for approval. The company will ask the city to stand one-half of the expense of its construction. The bridge is to be double decked. The upper deck will be laid with two trolley tracks. The lower deck will be a roadway, with a 6-ft. sidewalk on the south side.

Minneapolis, Minn.—The substructure of a bridge to be built at this place has just been finished and it is reported that bids will soon be asked for the superstructure. The bridge will be about 435 ft. long, having one 123 ft. truss and 5 plate girder spans. The roadway will be 42 ft. wide, and there will be two 6-ft. sidewalks.

Nevada, Mo.—The County Court has ordered the Bridge Commissioners to advertise for bids for two bridges, one across Hackberry Branch and the other over Kitten Creek.

New Orleans, La.—Senator Blanchard, on Jan. 24, introduced five bills in Congress, as follows: To approve and ratify construction of a bridge across Caddo Lake, at Moorensport, La., by the Kansas City, Shreveport & Gulf; bridge over Sulphur River, Ark., by the Texarkana & Fort Smith; bridge across Red River, between Arkansas and Texas, near Fulton, Ark., by the Texarkana Northern, now operated by the Texarkana & Fort Smith; authorizing the Kansas City, Watkins & Gulf to construct and maintain a bridge across Black River, in Louisiana, and across Red River at Alexandria, La.

New York.—We published last week the report of L. L. Buck, Chief Engineer of the new East River Bridge, which report recommended six tracks for trolley lines and elevated roads over the new bridge. The Commission met Jan. 30, and adopted a resolution endorsing the report as follows:

Resolved, That we construct a bridge, not exceeding 118 ft. wide, with six tracks thereon, two for the elevated railroad service and four for the surface railroad service with all the necessary approaches and switches and terminals—all tracks to be on the same level at the center of said bridge and to build a promenade for pedestrians over said tracks.

The approaches and tracks to be constructed so as to provide equally without discrimination for the railroad passenger service in both cities, and that the chief engineer be instructed to forthwith prepare plans accordingly.

For the preliminary work to be done this year it has been determined that $500,000 will be sufficient, and that amount Mayor Strong and Mayor Wurster have agreed shall be appropriated, each city paying $250,000.

Oakland, Cal.—It is proposed to replace the present bridges at Webster and Alice streets by a double bridge.

Oregon, Ill.—A committee has been appointed to report on the condition of the bridge over Rock River, which is declared unsafe. This committee will report next month.

Ottawa, Ont.—The Mayor and citizens of Ottawa waited upon the Premier on Jan. 31 to ask for assistance from the Dominion Government for the construction of the inter-provincial bridge across the Ottawa River at Nepeau Point. The estimated cost of this bridge is $750,000.

Peoria, Ill.—The question of rebuilding the bridge over the Illinois River at an estimated cost of $100,000 will be decided at the spring election.

Philadelphia, Pa.—There seems to be no prospect for the building of a new bridge at Gray's Ferry in the near future, although the city has, as we have before noted, appropriated $250,000 for this purpose. The estimated cost of a new bridge is $750,000, and the city's appropriation was made in the expectation that the Philadelphia, Wilmington & Baltimore, which owns and uses the present bridge, and the Union Traction Company, which desires to cross the Schuylkill at this point, would each contribute a similar amount. So far as can be learned, neither of these companies is willing to make the proposed expenditure.

Richmond, Ind.—A strong movement is being made by citizens to have a bridge erected across the river at South E street.

Rochester, N. Y.—The City Engineer, John McClintock, recommends that a bridge be constructed at Red Creek at a cost of $3,500. The construction of two bridges over Deep Hollow is also proposed.

Sibley, Ia.—A bridge will soon be built across the Big Sioux River, between Plymouth County, Ia., and Union County, S. D.

Sioux City, Ia.—The contract for widening the Chambers street bridge over the Floyd River has been awarded to Goodrich & Robson at $2,339.

St. Louis, Mo.—According to press reports, a contract was closed Jan. 25 with M. S. Carter & Co., of this city, for the construction of a railroad bridge across the Mississippi River from Davenport to Rock Island.

Streator, Ill.—An iron bridge will soon be erected over the Vermillion River near this place.

St. Thomas, Ont.—The bridge over Kettle Creek, for which bids are asked, will cost $1,200. The sub-structure will be of stone or concrete, and the superstructure of steel.

Terre Haute, Ind.—The Council has under consideration a proposed bridge at Ohio street.

Trinne, Tenn.—It is reported that an iron highway bridge is soon to be built at this place and that bids will be received by J. T. Jordan until Feb. 17.

Washington, D. C.—The Senate Committee on Commerce held a hearing Jan. 30 upon the proposition to build a bridge across the Detroit River at Detroit. Arguments for and against the building of the bridge were heard. The matter has not yet been decided

Senator McMillan has introduced into Congress a bill to do away with grade crossings of the Pennsylvania Railroad in Washington. It provides that the tracks of the system be depressed to such a distance below the street level that bridges can be built over them at each street crossing. The bill provides for 14 highway bridges of steel and a new steel structure across the Potomac in place of Long Bridge. The estimated cost of the improvements is nearly $4,000,000.

The District Commissioners have asked for bids for a plate girder highway bridge, the bids to be received until Feb. 11.

York, Neb.—Bids per lineal foot for all the bridges required in York County during 1896 will be received by J. D. White, County Clerk, until Feb. 18.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Missouri, Kansas & Texas Trust Co., quarterly, 1½ per cent., payable Feb. 15.

Saint Paul & Duluth, 2½ per cent. on the preferred stock, payable March 2.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cumberland Railway & Coal Co., annual, company's office, Place d'Armes, Montreal, Canada, Feb. 12.

Mineral Railroad & Mining Co., annual, company's office, Broad street station Philadelphia, Feb. 11.

Missouri Pacific, annual, company's office, St. Louis, March 10.

Norfolk & Southern, annual, company's office, Norfolk, Va., March 5.

Peoria & Eastern, annual, Danville, Ill., Feb. 12.

Philadelphia & Erie, annual, Broad street station, Philadelphia, Feb. 10.

Philadelphia & Trenton, annual, Broad street station, Philadelphia, Feb. 19.

St. Louis, Iron Mountain & Southern, annual, company's office, St. Louis, March 10.

Summit Branch, annual, 269 Broad street, Philadelphia, Feb. 11.

Wheeling & Lake Erie, annual, company's office, Toledo, O., Feb. 11.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual convention at Niagara Falls, beginning on Sept. 8.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago Mr. George M. Basford, is secretary, The Rookery, Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month. at 2 p m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City. on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November. at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month. at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville. Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street. San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at - p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston. Monadnock Block, Chicago, is secretary of the association.

The *Engineers' Club of Columbus*, (O.), meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' of St. Paul* meets on the first Monday of each month, except June, July, August and September.

Western Society of Engineers.

A meeting of the Society was held on Wednesday evening, Feb. 5. Mr. John F. Wallace, President, made an address in which many matters of interest to the Society were presented to the members.

Engineers' Club of Philadelphia.

The regular meeting of the club was held on Saturday, Feb. 1, at which time a paper was read by Mr. John E. Codman upon the boilers of the Queen Lane Pumping Station. The paper was illustrated by lantern slides.

Engineers' Club of Cincinnati.

At the annual meeting held on Dec 19, 1895, the following officers were elected for the year 1896: President, M. D. Burke; Vice-President, Chas. E. Lindsay; Directors, S. Whinery, H. M. Lune, G. W. Kittridge: Secretary and Treasurer, J. F. Wilson.

Mr. M. S. Burke read a paper on "Greater Cincinnati," in which, after a very complete historical sketch of the early history of the city, he described it as his fancy pictured it might appear in the year 1950, when it shall have acquired enlarged territory. its long desired improved and extended systems of water-works, parks and drives, improvements in transportation, etc.

At the January meeting a paper by Mr. E. F. Layman, on a proposed Park System for Cincinnati, was read by the Secretary.

Illinois Engineers' and Surveyors' Society.

The Society met in Galesburg, Ill., on Jan 29 and 30. A number of papers were read, among which were How to Survey a Mile Race Track, by D. L. Brancler, of Lincoln; Sanitary Engineering and the State Board of Health, by J A. Harmon, of Peoria; Wagon Roads of Illinois, by P. C. Knight, of Pontiac; Public Highways, by J. H. Burnham, of Bloomington. Discussion was also taken up on the Special Specifications for Paving Brick and Sewer Pipe The following officers were elected for the ensuing year: President, O. S. Stowell, of Rockford; Vice-President, J. H. Burnham, of Bloomington; Secretary and Treasurer, J. H. Alvord, of Chicago; Trustees, A. Lagron, of Freeport; T. S. McCallahan, of Monmouth, and C. H. Nicollette, of Springfield. The next meeting will be held in Springfield, Ill. At the end of the second day's session a banquet was held.

The Railway Signalling Club.

The regular meeting of the Railway Signalling Club was held in the Great Northern Hotel, Chicago, Jan. 28 at 8 o'clock. The discussion of the paper presented at the December meeting on "Switch Indicators," by Mr. W. W. Solman, was held first.

After a discussion the proposed revision of the constitution was read and adopted. Under this new constitution the annual meeting is to be held in January and the meetings are to be bi-monthly. thus making five instead of ten per year as formerly. The membership dues are raised to three dollars per year in order to permit the printing of the proceedings regularly after each meeting for distribution to the members.

Acting under the new constitution the following officers were elected: President, Mr. J. W. Gillingham, Signal Engineer of the Illinois Central Railroad; Vice-President. Mr. A. C. Miles, Signal Engineer of the Michigan Central Railroad; Secretary and Treasurer, Mr. G. M. Basford.

PERSONAL.

—Mr. W. W. Daniel, of Columbus, O., General Freight Agent of the Columbus, Sandusky & Hocking Valley Railroad, resigned last week.

—Mr. C. H. Hudson, Chief Engineer of the Southern Railway, has received the additional title of Mechanical Engineer, with special duties.

—Mr. Charles H. Zehnder, President of the Jackson & Woodin Company, Berwick, Pa., is the new President of the Dickson Manufacturing Co., Scranton, Pa.

—Mr. Edwin C. Hiser, Master Mechanic of the New York Central & Hudson River, Rome, Watertown & Ogdensburg and Adirondack & St. Lawrence roads, with office at Utica, has resigned.

—Mr. Oscar G. Murray has resigned as Second Vice-President of the Cleveland, Cincinnati, Chicago & St. Louis, and will act as associate to President Cowen in charge of the operating department of the Baltimore & Ohio.

—Mr. W. S. Kinnear has been appointed Assistant Chief Engineer of the Michigan Central. He was formerly connected with the road, but has more recently been an engineer of the Toronto, Hamilton & Buffalo in Canada.

—Mr. F. H. Eaton, recently Vice-President of the Jackson & Woodin Manfacturing Co. the car building concern of Berwick, Pa., has been elected President of the company to fill the vacancy created by the resignation of Mr. C. H. Zehnder.

—Mr. R. I Cheetham, for some time Division Freight Agent of the Seaboard Air Line at Atlanta, has also been appointed General Agent of the S. A. L. at that point, the duties of which have of late been performed by Mr. V. E. McBee, now General Superintendent.

—Mr. L. J. Seargeant, late General Manager of the Grand Trunk, sailed on the Campania from New York on Feb. 1 to assume his new duties as advisory member of the Board of Directors of the Grand Trunk. Many of the general officers of the Grand Trunk, including Mr. C. M. Hayes and Mr. G. B. Reed, came to New York to bid him farewell.

—Mr. Edward H. Johnson, for 25 years Consulting and Chief Engineer of the Chicago & Northwestern road, died suddenly Monday night of this week in a suburban traid, shortly after it left Ravenswood, Ill. Death was presumably caused by heart disease. Mr. Johnson was 74 years old and well known as an engineer in the west. He lived in Chicago.

—Mr. Harvey Middleton, whose resignation as Manager of the shops of the Pullman Car Company was noted in these columns last week, retired from the duties of the position on Feb. 1. Mr. Arthur M. Parent, Assistant Manager of the Pullman shops, is now acting as Manager. No appointment of a permanent successor to Mr. Middleton has yet been made.

—Mr. Clarence S. Bement, of Bement, Miles & Co., Philadelphia, Pa., has just been awarded the silver medal, "Bene Merenti," of the Royal Academy of Sciences, at Munich, Germany, for his untiring and distinguished services in advancing the science of mineralogy. As is well known, Mr. Bement has the finest private collection of minerals in the world.

—Mr. John Adams, the veteran General Superintendent of the Fitchburg, who retired from active duties in November, 1893, died in Concord, N. H., Jan. 31. He was in the employ of the Fitchburg about 40 years. He began his service as a machinist, and by regular promotions became General Superintendent in 1878. Since leaving the service of the Fitchburg road, Mr. Adams had visited California and Europe.

—Mr. N. J. Paradise, Master Mechanic on the Hannibal & St. Joseph and the other Burlington lines in Missouri died at Hannibal, Mo., on Jan. 27 of paralysis. He had been connected with the Burlington lines for nearly 40 years, all of that time in the mechanical department. He started as a locomotive fireman and was finally promoted to be General Master Mechanic of the Hannibal & St. Joseph in 1884.

—Mr. E. Schryver, Division Freight Agent of the Alabama Great Southern road, with headquarters in Birmingham, Ala., has been appointed Assistant General Freight Agent of the Cincinnati Southern at Chattanooga. He succeeds Don Alexander, who goes to Louisville, Ky., with the Southern. Mr. Schryver was recently General Agent of the Cincinnati Southern at Lexington, going to Birmingham about two months ago.

—Mr. Edmund Berkeley has been appointed Division Superintendent of the Seaboard Air Line. He will have charge of the Third Division, with headquarters at Atlanta, and succeeds Mr. V. E. McBee, who has recently been appointed General Superintendent and transferred to Portsmouth, Va. Mr. Berkeley is a very well known operating officer in the south, and for many years was Division Superintendent on the Richmond & Danville.

—Mr. G. L. Lansing, Secretary and Comptroller of the Southern Pacific Co., died at San Francisco on Feb. 4, aged 45 years. Mr. Lansing had lived at San Francisco since 1869 when he entered the auditing department of the Central Pacific as a clerk. He was promoted to be Chief Clerk and in 1885 became Assistant Comptroller of the Southern Pacific, and about three years later Secretary and Comptroller of the company, positions which he has held ever since.

—Mr. R. G. Matthews, who has been General Superintendent of the Buffalo, Rochester & Pittsburgh road for several years past, has resigned that office. Mr. Matthews was formerly Division Superintendent of the road and was made General Superintendent to succeed Mr. J. H. Barrett. Now the office is to be abolished and the duties of the position will be assumed by Mr. Merchant, who is Assistant to the President and was at one time General Manager of the property.

—Mr. Joseph M. Griggs, for many years General Ticket Agent of the Boston & Albany, died at his home in Springfield, Mass., on Feb. 3, at the age of 79. Mr. Griggs retired from the service of the road about five years ago. He began in 1842 and his service thus continued nearly half a century, though he left the road in 1851 and went to Hartford. He was called back soon after. Mr. Griggs' son, George B., now holds the place formerly occupied by his father, his title being Ticket Auditor.

—Mr R. D. Wade has resigned the position of Superintendent of Motive Power of the Southern Railway, and Mr. W. H. Thomas has been appointed to fill the position. Mr. Wade was born in New England, but all his railroad career, which began in 1857, has been on Southern roads and on lines now operated by the Southern Railway. In 1881 he was made Superintendent of Motive Power of the Richmond & Danville, the predecessor of the Southern Before that he had been Master Mechanic a number of years.

—Mr. A. G. Craig, who for several years has been Division Freight Agent of the Southern Railway at Charlotte, N. C., has been transferred to Birmingham, Ala., as Division Freight Agent of the Alabama Great Southern. The office of Division Freight Agent at Charlotte has been abolished, and the duties heretofore performed by that official will be looked after by Division Freight Agents David Cardwell, of Columbia, S. C., and J. B. Munson, of Raleigh, N. C. Only a rate office will be maintained at Carlotte, and J. S. Cox has been placed in charge of that.

—Mr. C. M. Lawler has resigned the office of General Manager of the Philadelphia, Reading & New England road, and Mr. W. J. Martin, the General Freight and Passenger Agent, has been appointed to succeed him as General Manager. Mr. Lawler went to the Philadelphia, Reading & New England late in 1893. He was first appointed General Superintendent, but in a short time became General Manager. He left the Philadelphia & Reading, of which he was Division Superintendent, to go to this road. Mr. Martin was formerly in the office of the General Passenger Agent of New York, Ontario & Western.

—Mr. Arthur Pew, M. Am Soc. C. E., sailed from New York on Friday of last week for Equador with Mr. J. S. Elliot, President of the Playa De Oro Coal Mining Co., of New York City, of which Mr Pew has been appointed General Manager. Mr. Pew is an engineer of long experience, especially in railroad construction. He was engaged on the construction of the Mexican Central Railroad, but recently has lived in Georgia and has located and built many roads of moderate length in that state. He has just completed the surveys for a 12-mile extension of the Tifton & Northeastern road into the new colony of Fitzgerald in North Georgia.

—Mr. James P. Dickson has resigned as President of the Dickson Manufacturing Co., Scranton, Pa., a position which he has held since June, 1893. Mr. Dickson is a son of the late Thomas Dickson, for many years President of the Delaware & Hudson Canal Co. He was born in Carbondale in 1852, and attended Lafayette College. He then spent two years in China and upon returning to Scranton was employed as a clerk in the office of the Dickson Company. In 1875 was placed in charge of the works at Wilkes-Barre, where he remained until 1882, when he was elected Vice-President of the company. One year later, upon the resignation of Col. H. M. Boies, he was elected President of the company.

—Mr. W. J. Spicer, General Manager of the Chicago & Grand Trunk and of the Detroit, Grand Haven & Milwaukee and other Grand Trunk properties west of the Detroit River, has resigned. The office of General Manager of these roads is to be merged with that of the General Manager at Montreal, in pursuance of the policy of merging the executive offices of the various Grand Trunk lines. Mr. Spicer has been General Manager of these roads for about 12 years, and previously had a long experience as General Superintendent of the Grand Trunk. Altogether he has been in the continuous service of that company for 40 years.

—The resignation of Mr. William Green, Superintendent of Bridges and Buildings of the Michigan Di-

vi ion of the Cleveland, Cincinnati, Chicago & St. Louis, has been followed by that of Mr. Robert Melrose, the Roadmaster, and of several other subordinate officers of that division. The newspaper accounts state that these officers had made charges affecting the integrity of their superior officers on the division. These charges were investigated by General Manager Schaff and other general officers last week, and as a result the accused officers were exonerated, and the resignation of those who preferred the charges followed. All the officers were employed on the old Cincinnati, Wabash & Michigan, and continued with the property when it was merged with the Big Four as its Michigan Division.

—General Orland Smith has resigned his position as Vice-President of the Baltimore & Ohio Railroad, and Mr. Oscar G. Murray, now Second Vice-President of the "Big Four," has been appointed to succeed him. General Smith's duties as the representative of the Baltimore & Ohio on the Board of Managers of the Joint Traffic Association, require him to spend so much of his time in New York, that he found it impossible to give the active attention to the duties of the Vice-President's office in charge of the traffic which the position requires. He will continue to represent the company upon the Board of Managers in the Joint Traffic Association. General Smith is President of the Baltimore & Ohio & Chicago Railroad and the Pittsburgh & Connellsville Company and the Parkersburg Branch Railroad Company, and other branch lines of the Baltimore & Ohio, and these positions he will continue to hold.

—Mr. W. H. Thomas, who succeeds Mr. R. D. Wade as Superintendent of Motive Power of the Southern Railway, is the former Superintendent of Motive Power of the East Tennessee, Virginia & Georgia. He retained that office for some time after the road was leased to the Southern Railway, but when the separate organization of the East Tennessee was done away with he was transferred to Washington, D. C., and has since been Assistant Superintendent of Motive Power of the Southern. Mr. Thomas went to the East Tennessee in 1885, accepting the position which he has since held. His early railroad career was on the Philadelphia & Erie, but about 1880 he went South as Master Mechanic of the Mobile & Montgomery. Since then he has been connected with the mechanical department of a number of the more important Southern roads, among them the Chesapeake & Ohio and Louisville & Nashville, of both of which he was Division Master Mechanic before going to the East Tennessee, Virginia & Georgia.

—Oscar G. Murray has resigned as Second Vice-President of the Cleveland, Cincinnati, Chicago & St. Louis Railroad, in charge of traffic, to become Vice-President of the Baltimore & Ohio Railroad. Mr. Murray is an officer whose activity, ability and force of character have long made him prominent in railroad affairs. His railroad experience had been altogether on roads west of the Missippi until he went to the old "Big Four" company about seven years ago as Freight Traffic Manager. Three years ago he was made Vice-President, and recently he was appointed the "Big Four's" representative on the Board of Managers of the Joint Traffic Association. It is understood that Mr. Murray will have no successor on the "Big Four." The office he held will be abolished, and its duties divided between Freight Agent Case and Passenger Traffic Agent McCormick. It is not yet known who will succeed Mr. Murray as the Big Four's" representative on the Board of Managers.

—Mr. W. K. Gillett, the General Auditor of the Atchison, Topeka & Santa Fe, whose resignation was recently noticed in these columns, is to remain with the company in the active performance of his duties until April 1. By that time the accounts of the old company and the Receivers will be closed and those of the new company systematized Mr. Gillett remains with the company until April at the earnest request of the officers, to give his advice in questions relating to the accounting methods of the new company. He retires from railroad service to give his attention to his large private interests. It is understood that he has made very profitable investments in Cripple Creek mining properties. He is also largely interested in the Midland Terminal Railroad, which has been built into those mines from the north. He will probably continue to reside in Chicago, although he may decide to come to New York. He was located in the latter city for a number of years as one of the auditors of the New York Central & Hudson River road.

—Mr. William A. Adams died Jan. 31 at Gaines, in the county of Hereford, England. Mr. Adams was one of the first makers of railroad equipment in England and an old member of the Institution of Civil Engineers (British) having been elected in 1865. He was one of the oldest members of the Institution of Civil Engineers to which he was elected while George Stephenson was President. In 1873 he, with his son, Mr. Oliver Adams, inaugurated the business of equipping railroads with rolling stock on what is now known as the car trust plan, and he has ever since had large interests in the United States, and a successful business of this kind is still carried on by Mr. Oliver Adams in New York City. We are told that the operations of this one house have brought into the United States about $19,000,000 of foreign capital. Mr. W. A. Adams was well known to railroad men in the United States and, of course, in Great Britain, and was an occasional contributor to the columns of this journal, to which he had been a subscriber from almost the first issue.

—Mr. James Stephenson, General Superintendent of the Grand Trunk, has resigned, but it is not yet decided when he will leave the service of the company. Mr. Stephenson says that he has been compelled to resign on account of impaired health, and that as soon as relieved of his duties he will go to Carlsbad, Germany, for treatment, a trip which he was compelled to take several years ago. Mr. Stephenson tells a newspaper reporter that his resignation was on his own initiative, and was due to the necessity forced upon him of giving up active work. Like so many other officers of the Grand Trunk he was born in England, coming to Canada as a young man. He entered the Grand Trunk service nearly 40 years ago, just before the line between Toronto and Montreal was opened for traffic. His first appointment was as clerk and telegraph operator at Toronto. Two years later he was made Station Agent, and since then his promotions have been frequent. In 1864 he was Assistant Superintendent, and in 1881 he became General Passenger Agent. Three years later he was appointed to the responsible position of General Superintendent.

—Col. W. P. Thompson, President of the Ohio River Railroad, died suddenly of pneumonia in New York City on Feb. 3. Colonel Thompson was interested in a number of West Virginia railroads, but he was more widely known through his connection with the Standard Oil Co., and in more recent years as President of the National Lead Company. He was educated as a lawyer, but practiced little. Soon after the Civil War he went to West Virginia and engaged in the oil business with his brother-in-law ex-United States Senator J. N. Camden. When the business of this firm was included in the Standard Oil properties Colonel Thompson came to New York and was appointed Vice-President of the Standard Oil Co. He was elected President of the National Lead Co. about four years ago, when the financial affairs of that company were much complicated. He was a director of many banks and other financial and commercial undertakings. He was a very active man and of a nature which readily brings social success. The illness which ended with his death was brought about by a trip which he took a week ago to investigate a property that had been purchased by his friends on his advice.

—Mr O. F. Nichols, until recently Chief Engineer of the Brooklyn Elevated Railroad Co., and lately General Manager of the same, has been made First Assistant Engineer of the new East River Bridge, of which Mr. L. L. Buck is Chief Engineer. Mr. Nichols was appointed Chief Engineer of the Brooklyn Elevated in 1883, and was afterward made General Manager in addition to his engineering work. Later the office of General Manager was abolished, Mr. I. D. Barton being made General Superintendent, having the duties of General Manager. Mr. Barton represented the Corbin interests, and with the opinion of those interests regarding the management of engineering affairs Mr. Nichols did not always agree. Mr. Nichols resigned his position on the Brooklyn Elevated Jan. 31, beginning his duties as Assistant Engineer of the East River Bridge on Saturday, Feb. 1.

Othneil Foster Nichols was born in Newport, R. I., in 1846. He came to Brooklyn at an early age and attended the public schools in that city, afterward studying the machinists' trade in New York. At 19 he entered the Rensselaer Polytechnic Institute, from which he graduated as a Civil Engineer in 1868. His first work after graduation was under Mr. C. C. Martin, now Chief Engineer of the New York & Brooklyn Bridge. In 1869 he was appointed Junior Assistant of the Greenwich Elevated road of New York and built the first foundations of the line north of Cortlandt street. In 1871 he became the Engineering Secretary for ex-Mayor Edward Cooper, of New York City. Later in that year he went to Peru and became Division Engineer of the Callao, Lima & Oroya, as well as Resident Engineer of the Chimbote & Huaraz roads. Here he was associated with Mr. L. L. Buck, the present Engineer of the new East River Bridge, who made much reputation by building the Verrugas viaduct on the line of the Lima & Oroya. After two years' work on the location and construction of tunnels, Mr. Nichols was put in charge of work on the mountain division of the Chimbote road in Northern Peru. Returning to the United States in 1876 he became Assistant Engineer of the Edge Moor Bridge Works at the time of the construction of the Metropolitan Elevated in New York by that company. He was later employed in the construction of a number of large sewers above the Harlem River, and in 1878 became Resident Engineer of the Madeira & Mamore road in Brazil. Between 1879 and 1882 he was Assistant Engineer of the New Jersey Steel & Iron Co., Resident Engineer of the Henderson bridge over the Ohio during its erection from 1882 to 1885, and Principal Assistant Engineer of the Suburban Rapid Transit Co., for about two years, resigning in the fall of 1888 to become Chief Engineer of the Brooklyn and Union Elevated roads. Since he became Chief Engineer of the Brooklyn Elevated road in 1888 he has acted as Chief Engineer of the Railway Construction Co., and the Seaside Elevated Railroad Co. During 1892 and 1893 he was General Manager of the Brooklyn Elevated Railroad, that office being abolished, as we have said, in 1894.

Mr. Nichols is a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Institution of Civil Engineers of Great Britain, the American Geographical Society and the Engineers' Club of New York.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Sante Fe—By changes in jurisdiction four offices in the operating department of the Western lines have been abolished. The jurisdiction of General Superintendent H. U. Mudge has been extended from Dodge City to Denver and south to Albuquerque and to El Paso and over the Silver City branch. The offices of Western Grand Division Superintendent, Assistant Superintendent of the Chicago Division, General Road Master of the Chicago Division, and General Road Master of the Eastern Division, are all abolished. Charles Dyer, who has been Superintendent of the Western Grand Division, will now be Superintendent of the Western Division from Dodge City to Denver. C. B. Strohm, who has been Assistant Superintendent of the Chicago Division, will be Train Master at Chillicothe, Mo., the present Train Master being made Chief Dispatcher.

Dubuque & Pacific.—This new company has been organized by the election of the following directors: Charles T. Hancock, B. J. O'Neill, W. H. Torbert, J. Kauffman, A. N. Heeb, J. W. Coates, J. W. Conchar, and George W. Keisel. The officers are Charles T. Hancock, President; B. J. O'Neill, Vice-President; W. W. Bonson, Secretary; F. A. Rumpf, Treasurer, all of Dubuque, Iowa

Erie.—At a meeting at the office of J. P. Morgan & Co., in New York on Feb. 4, the following Board of Directors was elected in place of the temporary Board which was appointed for the purposes of reorganization: C. H. Coster, Samuel Spencer, Francis L. Stetson, Samuel E. Williamson, J. J. Goodwin, Abram S. Hewitt, John G. McCullough, D. O. Mills, Alexander E Orr, George W. Quintard, E B. Thomas and J. Lowber Welsh. All except the first four named were directors of the old company.

Lake Erie & Western.—L. M. Schwan, of New York, has been elected a Director of the railroad in place of Nelson Robinson, resigned. Mr. Schwan is Secretary of the company.

Leeds Central—A meeting of the provincial directors was held a few days ago, at Harvey Mill Mines, Megantic County, Ont., the chief place of business of the company, at which the following officers were elected: William Lyman Hume, M. D., President; William Wilson, Mayor of Leeds, Ont., Vice-President; J. Ludger Berudoin, Secretary; James Reed, Managing Director; E. G. McKee, Assistant Secretary; J. I. Lavery, Solicitor.

Lehigh Valley.—The newly elected directors have completed their organization by electing the following officers: Charles Hartshorne, First Vice-President; Robert H. Sayre, Second Vice-President; John B. Garrett, Third Vice-President; W. C. Alderson, Treasurer; John B. Faushawe, Secretary; David G. Baird, Assistant Secretary.

Thomas McKune has been appointed Roadmaster of the Wyoming Division, to take effect Feb. 1, vice Mr. A. Morrison, resigned. Mr. McKune's headquarters will be at Wilkes-Barre.

Thomas McKune has been appointed roadmaster of the Wyoming Valley division to succeed Mr. Morrison, who recently resigned.

Little Miami.—The annual meeting of the stockholders was held last week at Cincinnati. The directors chosen were Henry Hanna, Frank J. Jones, Charles P. Taft and Morris M. White. The directors afterward organized and elected as officers for the ensuing year: Frank J. Jones, President, and Henry C. Urner, Secretary.

Millersburg & Brookside.—The incorporators of this new Pennsylvania Company are: John A. Barry, A. J. County, H. T. Wilkins, R. M. Williams and Alfred C. Heston, of Philadelphia, and H. P. Connor, Radnor, Pa. W. B. Schofield, of Camden, N. J., is President.

Missouri Midland.—The following are among the incorporators of this company, whose organization was noted last week: Frank Powell, mayor of La Crosse, Wis.; Dr. A J. Rowles of St. Paul, Minn.; L. S. Case, of Sumner, Ia., and D. T. Richart, of St. Paul.

Mobile & Ohio.—At the annual meeting of the holders of the general mortgage bonds and debentures of the Company, in New York, on Jan. 28, the following Directors were selected to serve for the coming year: J. C. Clarke, E. L. Russell, A. H. Stevens, J. S. Rogers, F. D. Tappen, H B. Plant, J. H. Masson, Adrian Iselin, Jr., Thomas E. Jevons, J. H. Fay, C. C. Cuyler. C. Sidney Shepard and W. Butler Duncan. The list is the same as last year, except that J. S. Rogers was elected to fill a vacancy.

Pittsburgh & Lake Erie.—The annual meetings of the Pittsburgh & Lake Erie and its branch, the Pittsburgh, McKeesport & Youghiogheny, were held at Pittsburgh on Jan. 29. The following officers and directors were re-elected: For the Pittsburgh & Lake Erie, D. W. Caldwell, President; Cornelius Vanderbilt, William K. Vanderbilt, F. W. Vanderbilt, Hamilton McK. Twombley, E. D. Worcester, J. H. Reed, M. W. Watson, Henry Hice, A. E. W. Painter, James M. Bailey, J. M. Schoonmaker and D. Leet Wilson. For the Pittsburgh, McKeesport & Youghiogheny, J. H. Reed, President; Cornelius Vanderbilt, William K. Vanderbilt, Hamilton McK. Twombley, James Tillinghast, D. W. Caldwell, James M. Bailey, J. M. Schoonmaker, M. W. Watson and Henry Hice.

Seaboard Air Line.—Edmund Berkeley succeeds V. E. McBee, elevated to the General Superintendency, as Superintendent of the Atlanta division of the Seaboard Air Line.

Southern.—Messrs. R. H. Jones and W. C. Stevens have been appointed Soliciting Agents of the Southern Railway, the former at Montgomery, Ala., and the latter at Knoxville, Tenn., vice J. M. Wyly and J. G. Cantrell, resigned. The positions of Northwestern Agent at Kansas City, of the Southern Railway, and Soliciting Agents of the same company at Augusta, Ga., New Orleans, La., and Washington, D. C., have been abolished.

C. L. Ewing has been appointed Trainmaster, from Greensboro, N. C., to Goldsboro, N. C., and Selma to Pinners Point (Norfolk). The heavy traffic over this new line of transportation of the Southern has made this necessary.

Southern Central.—The officers elected at last week's reorganization are as follows: President, Frank McLaughlin, Philadelphia; Directors, S. P. Wolverton, Sunbury, Pa.; S. J. M. McCarrell, Harrisburg; Joseph L. Tull, Alfred Gratz, Henry M. Gratz and Vincent McLaughlin, all of Philadelphia. The Treasurer is Robert L. Tull, of Philadelphia, who is also Assistant Treasurer of the Philadelphia & Reading. Joseph L. Tull is the Secretary.

Trinity, Cameron & Western.—The company has been reorganized by the election of the following directors: Frank Hamilton, Austin; Mark Weiss, Beaumont, Tex.; Frank Carothers, Jack Steele, A. S. Fisher, Georgetown; F. M. Crawford, Monta J. Moore, R. Lyles, Cameron, and J. C. Anderson, Granger, Tex. The directors have elected R. Lyles, of Cameron, President; F. M. Crawford, of Cameron, Vice-President; Frank Carothers, of Georgetown, Secretary. Mr. Hamilton assumes the management of the enterprise.

Wilkes-Burre & Northern.—The directors of this new company are: Alexander Farnham, Andrew Hunlock, Charles D. Foster, E. Troxell and H. W. Kalisch, of Wilkes-Barre, Pa.; C. A. Spencer and A. A. Holbrook, of Dallas, and P. Butler Reynolds, of Kingston, Pa. J. B. Reynolds, of Kingston, is President.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Altoona & Phillipsburg Connecting.—The line is now complete to Ramey, Pa., and the track is graded half way between Ramey and Janesville, about two and a half miles. As soon as the weather permits it will be pushed to completion.

American Central Trunk Line.—This title of a rail, road company comes to us from conservative Virginia, of all the states in the Union, and moreover, sanctioned, dignified and confirmed as its predecessors of the more remote Western states have not been, by an act of a state legislature. This extract, with its curious English, is from the charter approved by the legislature: "The company is authorized and empowered to construct, equip and operate a railroad of standard gage with a single or double track, commencing at a point it may select between the Potomac and York rivers in Virginia, and run thence by the most practicable and direct route to such point as they may select on the West Virginia state line" P. W. Reberd, L. D. Winston, W. H. Rickard, E. Purcell, Jr., and P. H. McCaull are the incorporators.

Aransas Harbor & Northern.—As stated last week, the preliminary survey for this road north of Aransas Pass, Tex., has just been commenced. The engineers now in the field are in charge of Rhoads Fisher, Jr., of Austin, Tex. They will run surveys for two routes, one via Rockport and Victoria, and a more westerly line through Refugio and Goliad. The proposed terminus at Smithville is on the Missouri, Kansas & Texas, 150 miles north of Aransas Pass. The line will be located as promptly as possible, and contracts for the construction of at least part of the line will be let at once. The road is projected by the same interests (largely Baltimore) capital, engaged in the deep water improvement at Aransas Pass. The officers of the company are: Percy B. McLaran, President, Baltimore, Md.; C. H Sawyer, Vice President and General Manager, Aransas Pass., Tex.; T. B. Wheeler, Secretary, Aransas Pass, and W. D. Jenkins, Chief Engineer, Ropesville, Tex.

Aransas Harbor Terminal.—The formal organization of the company was completed at a meeting at Aransas Pass, Tex., on Jan. 23. The names of officers are given in another column. The contract with J. P. Nelson, of Aransas Pass, to complete the 10 miles of road, which it is proposed to build to reach the main land, was confirmed. The contractor has already begun active work. Most of the roadbed will be constructed on piling, and the work will be pushed to completion as soon as possible. The road will extend from Aransas Pass on the mainland, to Harbor Island, and across Harbor Island to Mustang Island. About 3½ miles of the roadbed is about ready for the ties and about one mile of track is laid. This track was built about five years ago by Mr. Nelson, and he has just transferred his title and interest to the new company.

Buffalo & St. Mary's.—The grading on this road, north of St. Mary's, Pa., to Clermont, is about finished, so that the track-laying can commence shortly. The distance from St. Mary's to Clermont, where the new road will connect with the Western New York & Pennsylvania Railroad, is just 24 miles. The track will be laid with 75-lb. rails and metal tie-plates will be used. The object of the road is to extend the St. Mary's & Southwestern to a connection with the Western New York & Pennsylvania at Clermont, affording a direct outlet for the large body of coal south of St. Mary's in the vicinity of Toby Valley, owned by capitalists of St. Mary's and Ridgway. Branches from the main line will be built to reach timber lands.

Canadian Pacific.—The company is having a line surveyed from the Grand Falls road, Aroostock Junction, to Limestone, N. B. C. Le B. Miles, C. E., is the engineer. Construction will likely be commenced in the spring.

Central New Brunswick.—F. P. Killeen, C. E., will shortly apply to the Provincial Legislature for the authority to incorporate a company to construct a railroad from Fredericton to Moncton, N. B. The new company will be called the Central New Brunswick Railway Company. At present there exists a corporation called the Central Railway of New Brunswick, operating about 45 miles of road.

Central Ohio & Pennsylvania.—This company, whose organization at Cleveland was recently noted, is to build a railroad from Sharon, Pa., to Vienna, Warren County, to develop large stone quarry properties. Between Sharon and Brookfield a branch of the Erie Railroad will be used. The Directors are R. J. Hamilton, of Fulton, O.; C. J. Daley, of Sharon, Pa.; John A. Noof, Jr., T. C. Willard, J. K. Turner, and E. H. Eggleston, of Cleveland.

Cheat River.—This company was incorporated at Harrisburg, Pa., last week, to build a road about three and a half miles in length, from a point opposite Point Marion on the west side of the Monongahela River, crossing the river to Point Marion, and thence to the Cheat River, following its left bank, along the state line between West Virginia and Pennsylvania. The directors are: W. S. Guffey, Emmet Queen, George Heard, W. F. Johnson, George D. Prentice and Joseph M. Cooper, all of Pittsburgh.

Danville & Riverside.—This is one of the railroad companies recently incorporated by the Virginia Legislature. The company may construct a standard gage steam road from Danville, Va., to a point on the line of West Virginia, west of Marion County, West Virginia. The incorporators are T. B. Fitzgerald, John School field, James E. Schoolfield, R. A. Schoolfield, F. X. Burton, W. P. Bethel, R. A. James, C. G. Holland, James G. Penn, B. F. Jefferson, J. N. Wyllie, R. L. Anderson, H. R. Fitzgerald and James P. Harrison.

Galveston, La Porte & Northern.—The Special Master in Chancery has reported favorably on the application of the receivers to issue certificates to the amount of $250,000, necessary to complete the road between Houston and Galveston, Tex. Judge Bryant has granted the application. Very little work, beyond completing a drawbridge and the ballasting remains to be done.

Florence Southern.—About two-thirds of the right of way to Silver Cliff is said to have been secured, and the officers state that the work will begin March 1 on the road, which is an extension of the Florence & Cripple Creek Railroad from Florence south to Silver Cliff, Col., a distance of 35 miles. The road will penetrate a rich agricultural region. W. E. Johnson, the President, has been in New York to interest capitalists and is assured of funds to build and equip the road.

Manchester & Milford.—The projectors of this branch road, from Milford to Manchester, N. H., assure the public that they are not dismayed by the unfavorable report of the referees appointed by the Supreme Court. They state that the petitioners do not regard the findings as adverse to a charter. Hon. Franklin Worcester, the prime mover in the project says: "The friends of the enterprise do not look upon the commissioners' report as unfriendly to the project. Every essential that is material for the construction of the new road is admitted. The commissioners admit that it is desired by 60,000 people, and is opposed alone by the Boston & Maine. They ackowledge that it would be a great advantage to the city of Manchester by giving through lines to the West and South; that it would enhance the value of realty of Amherst and Bedford and the towns along its lines, and would save 11 miles or more of travel in reaching Manchester. In view of these admissions, which we regard as the essential points to be considered in the granting of new charters, we cannot conceive a condition of things which would deny to the people an enterprise which is so much desired. The findings of the commissioners are not final: they simply pass upon certain facts. The Supreme Court is the final arbitrator, and the matter will be placed betore the court for action."

Mexican Roads.—The project of building a railroad from Saltillo, Mex., to the town of Pia La, on the Mexican International road, has been revived, and it is announced that the financial arrangements have been completed for the early construction of the line. The road will pass through the wealthy city of Parras, and will open up a rich agricultural and mineral district.

Millersburg & Brookside.—This company was incorporated on Jan. 31 to build a road from a connection with the Northern Central near Millersburg, thence easterly to a point near Brookside. The length of the road will be 23 miles. The capital stock is $230,000. William B. Schofield, of Camden, N. J., is President. The road will be parallel for some distance with the Lykins Valley branch.

Nashville, Chattanooga & St. Louis.—This company is constructing a branch line from Centreville, Tenn., in a southeasterly direction to a point where Swan Creek enters Duck River, a distance of 4½ miles; 1½ miles are graded and 1¼ miles of track laid. There are about 30 men now at work, and the contract has been let to P. Brady & Co. The maximum grade is 1½ per cent., and the maximum curve 12 deg. This branch is being constructed for the purpose of developing the phosphate industry, a large quantity of which has been found in the neighborhood of Swan Creek in Hickman County, Tennessee.

New Roads.—The business men of Union, S. C., are agitating the subject of building a branch road from that place to Whitmire, S. C., where it would reach the Georgia, Carolina & Northern division of the Seaboard Air Line. A new cotton mill and other factories are being built, which will give considerable freight, and a road competing with the Southern is desired.

Ottawa, Arnprior & Parry Sound.—E. Farquhier, of Toronto, has sublet to Poulin & Fitzpatrick 20 miles of the western section of this road, part of the contract recently awarded to him.

Potomac & Ohio.—This is a new Virginia corporation, which has just secured a charter from the legislature. The company is authorized to construct a railroad from the Potomac River, near the city of Alexandria, to a point on the West Virginia line within the counties of Rockingham or Shenandoah in Virginia. The incorporators are Michael B. Harlow, J. Clinton Smoot, Frederick Mertens and James R. Cator.

Queen Anne's.—The contractors on the road, between Queenstown, Md., and Lewes, Del., are pushing the work with all possible haste. The wharves at Queenstown, on Chesapeake Bay, have been completed, and President William H. Bosley says that the first section, extending from Queenstown to Denton, Md., a distance of 20 miles, will be in operation within 90 days. He expects that the entire line to the Atlantic coast will be completed by September. The contract for building the second section will be awarded within two weeks. The route has already been graded, and is ready for tracklaying.

Seaboard Air Line.—The officials of this company are reported to be considering a proposition to build an extension from Rutherfordton to Asheville, N. C., a distance of 42 miles.

Southern Central.—This company was reorganized Feb. 1 at Harrisburg, Pa., with a capital stock of $3,000,000, to build a line 52 miles long from Harrisburg to Sunbury. The new corporation purchased the franchises of the old Southern Central a few months ago at sheriff's sale. Most of the rights of way have been secured, especially the important stretch through the Rockville Narrows of the Susquehanna River. The officers are given in another column.

Sunnyside, Hamburg & Western.—A preliminary survey of the road is now being made from Sunnyside on the Mississippi River to Hamburg, Ark., a distance of 50 miles. The road will be built principally by Italian colonists, whom Austin Corbin, of New York, recently located at Sunnyside. A subsidy of 30,000 acres of land has been pledged by citizens of Chicot and Ashley counties, Arkansas, to secure the road. The road will open up a valuable agricultural and timber country.

Timpson & Carthage.—This railroad is now graded from Timpson to Russell, Tex., a distance of seven miles. The ties and bridge timbers have been distributed along the line and the work will be pushed through without any delay.

Western New York & Pennsylvania.—The railroad is about to extend its line from New Castle to Mahoningtown, Pa., a distance of about 2½ miles, to connect with the line which is to be built down the Mahoning Valley.

Wilkes-Barre & Northern.—This company was incorporated in Pennsylvania on Jan. 30, to build a road to extend from the city of Wilkes-Barre to the mouth of Harvey's Lake, about 15 miles, all located in Luzerne County. The capital stock is $200,000. John B. Reynolds, Kingston, Pa., is the President.

Electric Railroad Construction.

Baltimore, Md.—The Baltimore Traction Co. has commenced work on its new electric line to Westport and Meeter's. A large force of men has been put to work on the grading.

Brockton, Mass.—The Brockton, Bridgewater & Taunton Street Railway Co. has been organized to construct a railroad from Montello through Brockton, West Bridgewater, Raynham and Taunton, a distance of 18 miles. The capital stock of $100,000 has all been subscribed.

Cleveland, O.—The County Commissioners have granted a 25 years' franchise to the Cleveland & Chagrin Falls Railway Co. The construction of the line is to be commenced by May 18. The road will be single track, 14 miles long, and extend to Chagrin Falls, passing through Warrensville, Lewis Corners and Bentleyville. The company has permission to carry passengers, baggage, express packages, mail, farm produce and boxed and barreled freight. The company has a capital of $300,000.

The Cuyahoga Suburban Railway Co. also has a franchise to operate a line from Cleveland to Chagrin Falls. Its road will begin on Miles avenue, at the present terminus of the Broadway line.

Elizabeth, N. J.—The Middlesex & Union County Railway Co. proposes to extend its lines from Rahway through Linden and Elizabeth to Summit, the extension to be ultimately carried to Woodbridge and Perth Amboy.

Mamaroneck, N. Y.—The New York, Elmsford & White Plains Railroad Co. has obtained a franchise to construct an electric railroad in Mamaroneck avenue, in Mamaroneck. This road will connect with the Elmsford extension.

Patchogue, L. I.—The Patchogue & Port Jefferson Traction Co, was organized last week. The company, which has a capital of $400,000, proposes to build an electric road from Patchogue to Port Jefferson, 15 miles across Long Island. The following were elected officers of the Board of Directors: President, Edwin Bailey, Patchogue; Secretary, J. B Swezey; Treasurer, Frank Miller.

Philadelphia.—It is announced that work on the construction of the Delaware & Schuylkill Electric Railway will begin at once, and that the road will be in operation by next summer. It will be about nine miles long, extending from the Schuylkill Falls through Germantown to Frankford. A. Langstaff Johnston is the Consulting Engineer.

Pierre, S. D.—A survey has been made for the proposed Pierre & Port Pierre Street Railway, and the necessary equipment for the road has been secured by the projector, Mr. N. McGeorge, who says the line will be in operation early in the spring.

Plattsburgh, N. Y.—A franchise has been granted to the Plattsburgh Traction Co. by the village trustees, giving the company the right to establish an electric railroad here. It is expected that the line will be in operation between Plattsburgh and Bluff Point by July.

Portland, Ore.—Articles of incorporation of the Portland Railway Company have been filed by O. F. Paxton, A. F. Sears, Jr., and J. V. Beach. The company is to acquire the Portland Consolidated Street Railway Company's lines, the Vancouver line and the Oregon City line. The capital stock is $800,000. The Portland Railway Company, which has a capital of $800,000, is a temporary organization in the interest of the Eastern bondholders who recently bought the Portland Consolidated street railroads.

Sistersville, W. Va.—E. Finley Kitson and others, of Sistersville, are interested in a proposed electric railroad, for freight and other traffic, from Sistersville to Mannington, by way of Middlebourne. It is proposed to build a standard gage railroad to run freight cars into the oil-fields of Sistersville and Mannington. At present it costs from $1 to $3 a ton per mile to deliver freight through those fields, wagons being the only means of transportation. The line will extend through rich oil-fields. A survey of the line is to be made this month.

Skowhegan, Me.—The Somerset Traction Co. has been organized to construct a street railroad, with $75,000 capital stock, of which $30,000 is paid in. The officers are: President, R. B. Shepherd; Treasurer, T. H. Anderson, both of Skowhegan.

St. Catharines, Ont.—E. A. C. Pew is projecting an electric railroad across the northwestern portion of Ontario, from Port Perry to Lake Huron. A charter will be applied for at the present session of Parliament. A New York company, it is said, will build the road without asking for a bonus or government assistance.

West Troy, N. Y.—The Cohoes City Railway Co. has applied for permission to extend its tracks on several streets of this place, so as to make connection with the Albany City Railway Co.

White Plains, N. Y.—Application has been made by the North Mount Vernon Railway Co. for a franchise to construct an electric road from Mount Vernon to White Plains by way of Scarsdale.

GENERAL RAILROAD NEWS.

Atlantic & Pacific.—The new Receiver, Mr. C. W. Smith, assumed control Feb. 1. It is stated positively by representatives of the Atchison and the Atlantic & Pacific bondholders, that the arrangement for an independent Receiver is an entirely friendly one, and that all rumors that it precedes a seperation of interests between the two companies, and closer relations between the Atlantic & Pacific and the Southern Pacific are entirely without foundation.

Baltimore & Drum Point.—A bill to be submitted to the Maryland Legislature is being prepared by J. C. Rose, the company's attorney, for changing the name and increasing the corporate powers of the company. The name of the company is changed to the Baltimore & Southern. It will authorize a capital stock of $1,500,000. The right is given to the company to construct from the mouth of the Patuxent River to Baltimore city. The bill provides for the use of both steam and electricity as motive power. A rate of four cents a mile for each passenger carried and eight cents a ton a mile for all freight is permitted to be charged by the company.

Baltimore & Ohio Southwestern.—The company reports earnings for the six months ending Dec. 31 as follows:

	1895.	1894.	Inc. or Dec
Gross earn	$3,449,232	$3,325,767 I.	$123,465
Oper. expen	2,179,639	2,042,856 I.	136 783
Net earn	$1,269,593	$1,282.911 D.	$13 318

The surplus over fixed charges is $216,591.

Buffalo, Rochester & Pittsburgh.—The company reports earnings for the quarter ending December 31 as follows:

	1895.	1894.	Inc. or dec.
Gross earn	$791,697	$791 545	D. $148
Oper. exp	587,434	530,919	I. 56,515
Net earn	$203,663	$200,626	D. $56,963
Other income	11,709	11,354	I. 355
Total income	$215,372	$271.980	D. $56,608
Fixed charges	212,654	217,990	D. 5,336
Surplus	$2,718	$53,990	D. $51,272

Chicago, Milwaukee & St. Paul.—The statement of earnings for the month of December and for the first six months of the fiscal year gives the following figures:

Month of December:	1895.	1894.	Increase.
Gross earn	$2,764,652	$2,203,523	$ 61,128
Oper. expen	1,527,792	1,302,275	225,516
Net earn	1,236,859	901,247	335,611
Six months, ending Dec. 31:			
Gross earn	$18,067,721	$14,795,090	$3,272,631
Oper. expen	10,165,127	9,461,027	704 096
Net earn	7 902,594	5,334,062	2,568,532

Cincinnati, Hamilton & Dayton.—The company reports its earnings for the year ending June 30, as follows:

	1895.	1894.	Inc. or Dec.
Gross earn	$5,039,136	$5,094,512	D. $55,676
Oper. expen	3,411,150	3,370,408	I. 40,742
Net earn	$1,627,986	$1,724,404	D. $96,418
Fixed charges	1,297,100	1,294,776	I. 2,324
Surplus	$330,886	$429,628	D. $98,742

Chicago, Burlington & Quincy.—The statement of earnings for December shows an increase in gross of $264,361, and an increase in net earnings of $104,221. This compares with a decrease of $435,874 in gross earnings reported in 1894, and a decrease of $90,122 in net earnings. The figures follow:

	1895.	1894.	1893.	1892.
Gross exp	$2,724,717	$2,460,355	$2,896,230	$3,514,275
Oper. exp	1 533,301	1 391,414	1,714,285	2,215,711
⅓ fixed charges	815,000	797,247	822,880	815,075
Net earn	375,915	271,693	359.064	513,489
Twelve months:				
Gross earn	31.652 364	31,514,877	38,356,483	40,412.401
Exp	19,528,024	19,114,307	24,502,189	26,158,996
Total charges	9,78 ,000	9,566,972	9,874.570	9.780,900
E p. and charges	29,308,024	28,681,279	34,276.759	35,939,897
Net earn	2,344,339	2,833,593	3,979.723	4,472,504

The December freight earnings were $1,731,794, an increase of $249,984. In 1894 the decrease was $467,151. Freight earnings in 1895 were $20,028,108, a decrease of $238,648. For 1894 the company reported a decrease in freight earnings of $3,963,010. Passenger earnings for December were $577,988, a decrease of $14,922. In 1894

the decrease was $4,007. Passenger earnings in 1895 were $7,449,742, increase $208,385. In 1894 passenger earnings decreased $2,944,023.

Columbus, Hocking Valley & Toledo.—The railroad company reports earnings for the year ending Dec. 31 as follows:

	1895.	1894.	Inc. or Dec.	
Gross earn	$2,656,162	$2,688,700	D.	$32,538
Oper. expen	1,477,535	1,442,774	I.	34,761
Net earn	$1,178,627	$1,245,926	D	$67,299
Other income	10,000	10,000		
Total income	$1,188,627	$1,255,926	D.	$67,299
Fixed charges	1,131,795	1,147,354	D.	15,559
Balance	$56,832	$108,572	D.	$51,740
Dividends or pref	100,000	100,000		
Deficit	$43,168	Sur. $8.572	I	$51,740

Delaware & Hudson.—The summary of profit and loss account of the Delaware & Hudson Canal Company for the year ending Dec. 31 shows:

	1895.	1894.	Inc. or dec.	
Receipts from coal	$7,369,379	$7,864,152	D.	$494,773
Receipts from railroads	10,129,082	9,448 993	I.	680,089
Miscellaneous	1,321,157	755,074	I.	566,083
Total gross	$18,819.618	$18,068,219	I.	$751,359
Oper. exp	13,576,732	12,529,547	I.	847,185
Net earn	$5,412.886	$5,538,672	D.	$95,786
Int., taxes, and rentals	3 078,491	3,319,959	D.	241,468
Balance	$2,364 395	$2 218,713	I.	$14,682
Per cent. earn. on stock	7.5	7.1	D.	5 35

Delaware, Lackawanna & Western.—The company reports the following earnings for the year ending Dec. 31:

	1895.	1894.	Inc. or Dec.	
Gross earn	$44,201.9 9	$43,058,862	I.	$1.143.047
Oper. exp	37,441,009	36 009,195	I.	1,431 814
Net earn	$6,760,900	$7,049,667	D.	$288.767
Fixed charges	5,406,239	5,412,323	D.	6,084
Balance	$1,354,661	$1,637 344	D.	$282,683
Dividends	1.834,000	1,834,000		
Deficit	$479,339	$196,656	I.	$282 883

Georgia Midland & Gulf.—This road was sold at Columbus, Ga., on Saturday last, to the bondholders for $500,000. The company operates 100 miles of road from McDonough to Columbus.

Harrisburg & Bedford.—Mr. Thomas B. Kennedy, President of the company, has applied for an order of the court to dissolve the corporation. The company was chartered in 1890 to build a road from Shippensburg, Pa., on the Cumberland Valley road, and the Baltimore & Cumberland Valley Division of the Western Maryland, to Mount Dallas, Bedford County, Pa. The road was to be built by the Pennsylvania and the Cumberland Valley to form a short line from the soft-coal regions of Southern Pennsylvania and West Virginia to the seaboard. About $12,000 was expended on the surveys. Since then the Cumberland Valley has acquired the right of way, and the unfinished tunnels and other property of the old South Pennsylvania project, and will build along part of the abandoned road bed when financial conditions permit.

Lake Street Elevated, Chicago.—The affairs of this company, through the quarrels of the contending bondholding interests, are becoming more involved from week to week. The Farmers' Loan & Trust Co., of New York City, co-trustee of the first mortgage bonds for $7,775,000, began proceedings for foreclosure in the United States Circuit Court at Chicago on Jan. 30. This action was taken by the Trust Company at the request of certain of the bondholders (holding about $600,000 of the bonds), who allege that the last two semi-annual interest payments have been defaulted. On the same day an order was issued in the Illinois Superior Court restraining the Trust Company from beginning foreclosure proceedings against the railroad. This will bring up a question of jurisdiction between the state and the United States courts. The contest is brought about by a disagreement between the Yerkes interests, who have prepared a plan for the reorganization of the company, and William Zeigler, who is a large bondholder, and who has opposed vigorously the plans for reorganizing the property.

Montgomery, Tuscaloosa & Memphis.—At the foreclosure sale of the railroad on Feb. 3 in Montgomery, Ala., Col. H. C. Tompkins, representing the bondholders, bid in the property for $300,000. The road is partially graded out of Montgomery, northwest toward the Tuscaloosa River.

New York, Pennsylvania & Ohio.—The date of the sale of the railroad by the Receiver, John Tod, of Cleveland, has been set for Feb. 25. The sale will include the leaseholds of the Niles & New Lisbon and Liberty & Vienna roads. The upset price is $10,000,000.

New York, Philadelphia & Norfolk.—The net earnings of the company for the year 1895 were $201,914, more than sufficient to pay six per cent. interest on all of the company's outstanding bonds, including the incomes. No interest has been paid on the latter, though it has been fully earned during the last two years, the money being devoted to the improvement of the property.

The following is the statement of earnings for the years of 1895 and 1894:

Year.	Gross earn.	Expenses.	Net earn.
1895	$912 553.94	$710,619.60	$201,914.34
1894	904,691.95	705 846.47	198,845.48
Increase	$7.841 99	$4,773.13	$3,068.86

Norfolk & Western.—The bill recently introduced in the Virginia Legislature to facilitate the reorganization of the railroad company has been approved by the Governor and is now a law.

Northern Pacific.—The earnings of the company for December, and the half year to Dec. 31, are reported as follows by the Comptroller, John Scott:

December:

	1895.	1894	Inc. or dec.	
Gross earn	$1,496,399	$1,315,780	I.	$180,619
Oper. exp	919,654	945,574	D.	25,920
Net earn	$ 576,745	$ 370,206	I.	$206,539
Per cent. exp. to earn	61.46	71.86	D.	10 40

Six months to Dec. 31:

Gross earn	$11,989.283	$10,335,617	I.	$1,653,666
Oper. exp	6,136,090	6,152,924	D.	16,834
Net earn	$5 853,193	$4,182.693	I.	$1,670,500
Per cent. exp. to earn	51.18	59.53	D.	8.35

The above statement does not include miscellaneous income, as the taxes are not deducted.

North Carolina.—The suit begun in the Superior Court, at Greensboro, N. C., by stockholders, to cancel the lease of this road to the Southern, which went into effect Jan. 1 last, has been withdrawn. That is the end to this individual suit. But there is still a case in the courts, brought at the instance of the Farmers' Alliance, for the same purpose. It is expected that this suit will also be withdrawn.

Pittsburgh & Lake Erie.—The following figures are given from the annual report for the year to Dec. 31:

Earnings and Expenses.

	1895.	1894.
From freight	$4,133,854	$3,359,195
From passengers	503 985	453.175
From express	21, 99	22,148
From mails	20,021	20,133
From all other sources	25,669	25,664
Total earnings	$4,704,857	$3,880,175
Operating expenses and taxes	3,09 .396	2,655,623
Net earnings	$1,314,761	$1,224,552
Increase in gross earnings	824,681	21 25 p. c.
Increase in operating expenses	734,473	27.66 "
Increase in net earnings	90,208	7.37 "

The above figures include the earnings of the Pittsburgh, McKeesport & Youghiogheny, and are for a total of 163 miles of track.

Port Royal & Western Carolina.—The suit against the confirmation of the sale of this road to Messrs. Thomas and Ryan came up for a final hearing before Judge Simonton in the United States Circuit Court, at Charleston, S. C., on Jan. 29. Counsel representing those objecting to the confirmation of the sale opposed confirmation on the ground that the Southern Railway was interested in the purchase, Messrs Thomas and Ryan, the purchasers, acting, if not as agents of the Southern, in the interest of that railroad; and that under the laws of South Carolina providing against the purchase of any competing road by a competitor, the sale should be declared void. Messrs. Thomas and Ryan stated that they had purchased the road on their own account, and that it would be operated in the future as an independent line. They further stated that they were willing to resign their positions as directors of the Southern Railway, and would dispose of their interests in that property. Thereupon Judge Simonton stated that he would confirm the sale of the road to Thomas and Ryan, under those conditions, as soon as the conditions had been complied with. Three counties in South Carolina (Laurens, Anderson and Spartanburg) and the city of Greenville, subscribed largely to aid in building the line and are now paying interest on the bonds, in order to secure competition with the Southern and they are satisfied with this arrangement. It is stated that the road will probably be operated by John B. Cleveland, the old receiver.

Roanoke & Southern.—Terms have been about agreed upon by which the railroad will be absorbed in the reorganization of the Norfolk & Western. The bonds of the Roanoke & Southern are principally held in Baltimore. The company owns 125 miles of road from Roanoke, Va., to Winston-Salem, N. C.

Silverton.—On account of the road being blocked at several points by heavy snow slides, its operation has been suspended for the present. The road extends from Silverton to Ironton, a distance of about 17 miles.

St. Louis & San Francisco.—Negotiations toward the reorganization of the company are still pending between the various parties representing different interests in the property, but thus far no agreement has been reached. It is probable that steps will soon be taken to bring about a unification of the various interests and the formation of a General Reorganization Committee.

York Southern.—A close traffic agreement, extending over a long period of years, has, it is understood, been entered into by which the Pennsylvania will hereafter operate this line. Prior to its recent reorganization, the York Southern formed the Pennsylvania portion of the Baltimore & Lehigh road. It was bought and reorganized under its present name by Mr. W. F. Walworth, of Cleveland, O. First mortgage bondholders bought the Maryland portion and reorganized it as the Baltimore & Lehigh, thus separating the system. The York Southern extends from Peach Bottom, Pa., on the Susquehanna River, near the Maryland state line, to York, 40 miles, and was rebuilt as a standard gage road.

Electric Railroad News.

Albany, N. Y.—State Senator James Burns has introduced a bill providing that the post road from New York to Albany shall be a public highway, and prohibiting the laying of any railroad track on the road except within New York City. This would prevent the building of electric roads in most towns on the east side of the river, as the post road is the principal street in nearly all of these towns.

Alexandria, Md.—The electric motors, which are being made by the General Electric Co., of Schenectady, for the Washington, Alexandria & Mt. Vernon Railroad, are to run the loaded cars at a speed of from 35 to 40 miles an hour. The capacity of the motors on loads below the average will, of course, run above the speed, and may run as high as 60 miles an hour, but such a speed is not proposed for regular service, and the present schedule does not permit it in regular running.

Baltimore, Md.—The City Council Committee on Passenger Railroads decided last week to grant an extension of time for the completion of the Edmondson Avenue, Catonsville and Ellicott City Railroad till April 20, 1897.

Milwaukee, Wis.—The Milwaukee Street Railroad was sold last week for $5,000,000 to William Nelson Cromwell, C. W. Wetmore, Arnold Marcus, of New York; Frank G. Bigelow and B. K. Miller, Jr., of Milwaukee. It is said that a reorganization will be made under the name of the Milwaukee Electric Co., with a capital stock of $8,000,000.

New York City.—Permission has been given to the Electric Storage Battery Co., of Philadelphia, to make experiments with its motors on the branch line of the Third avenue elevated running to the Thirty-fourth street ferry.

Norfolk, Va.—The Portsmouth Street Railway Co. has filed a deed of mortgage to the Union Trust Co., of Philadelphia, as trustee, for $500,000, to secure the payment of 750 five per cent. gold-bearing bonds.

Philadelphia.—The Union Traction Co. has restored the 10 cent fare from Frankford down Tenth street. The company hitherto has sold eight-cent exchange tickets good on the Tenth street cars of the Second and Third Streets Line.

TRAFFIC.

Traffic Notes.

Denver papers report that the contest between the rival coal companies and the consequent low price continues, and is likely to remain unsettled all winter, but the passenger rate war between the rival railroads has been settled.

The hearing before the Texas Railroad Commissioners concerning freight rates on cotton to Galveston (that city having complained of being discriminated against) was begun last week, but has been adjourned until some time in May.

The hearing on the application for an injunction against the Joint Traffic Association has been postponed in the United States District Court at New York until Feb. 14, and it is probable that at that time a further postponement until some time in March will be ordered.

Judge Morris of the Fifty-third Texas District Court, on Feb. 3, granted an injunction restraining the State Railroad Commission from enforcing its regulation of rates for compressing cotton. He finds that the Commission has no authority to make such regulations, because they are compress rates and not freight rates, such as the Commission is authorized to regulate.

The strong pressure constantly felt by railroad officers who set out to maintain rate agreements is illustrated in the report of a recent annual convention of the Missouri & Kansas Retail Lumber Dealers' Association. The members of this association travel long distances to their annual meeting, and they generally want a special train, but this year they could not get one at rates within their means because the railroads had bound themselves by the pass agreement, a prominent feature of excursions being the passes given to advance agents, etc. One of the southwestern roads, to placate the persistent lumbermen, promised to try to have next year's pass agreement modified so that the road would be able to favor the lumbermen. When passes have to be promised a year ahead it certainly must be concluded that they are precious things.

Chicago Traffic Matters.

CHICAGO, Feb 5, 1896.

The roads of the Western Freight Association, with the exception of the Chicago Great Western, have decided to make no less rate for the shipment of stock cattle from Chicago to interior Illinois points, or from Missouri River to Missouri and Iowa points, than is made on live stock shipped to Chicago and the Missouri River packing centers. Under the Illinois classification stock cattle are to be transported at a rate of 25 per cent. below that of other live stock. The Illinois lines say that this rule is unreasonable, and with the exception of the Chicago Great Western have decided to ignore it.

Rates from St. Paul to North Pacific Coast points are being cut $4 by the manipulation of advertising tickets of the issue of the Great Northern road. This line has been called upon by the Chairman of the Western Passenger Association to put an end to the manipulation unless it can be shown that it is in no way to blame.

By a unanimous vote the lines of the Western Passenger Association have agreed to withdraw 10-ride party tickets throughout their territory Feb. 10. It is believed that all of the Western roads will continue to sell party tickets at 2 cents a mile to theatrical parties.

Outside lines are doing their best to embarrass the Joint Traffic agreement in the West. While the roads eastbound from Chicago and St. Louis are straining every nerve to maintain tariff rates, the Clover Leaf is reported to be cutting rates from St. Louis with a free hand. Cutting or not cutting, it is carrying 25 per cent. of the eastbound shipments from St. Louis. The Lake Erie & Western, another free lance, is reported to be making liberal concessions on through shipments from the west via Peoria. The Canadian Pacific is taking grain from St. Paul to the seaboard, via the Soo Line, at from 2 to 4 cents less than the rates via Chicago. None of these cuts have as yet been met by any of the Joint Traffic lines. On account of its long-lived and iron-clad traffic contract with the Boston & Maine the Canadian Pacific claims that it cannot be shut out of a United States seaport; but the Clover Leaf, and Lake Erie & Western are at the mercy of the Joint Traffic lines, and will undoubtedly be whipped into line.

The shipments of eastbound freight, not including live stock, from Chicago by all lines for the week ending Feb. 1 amounted to 79,362 tons, compared with 77,704 tons during the preceding week, an increase of 1,658 tons, and against 54,256 tons for the corresponding week of last year. The proportions carried by each road were:

Roads.	Week to Feb. 1.		Week to Jan. 25.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	9,666	12.2	8 315	10.7
Wabash	6,376	8.0	7,752	9.9
Lake Shore & Mich. South.	9,649	12.1	11,267	14.5
Pitts., Ft. Wayne & Chicago	6.539	8.2	6,804	8.7
Pitts., Cin., Chi. & St. Louis.	8.416	10.6	8,415	10.8
Baltimore & Ohio	5,065	6.4	5,593	7.2
Chicago & Grand Trunk	9.016	12.6	8,699	11.4
New York, Chic. & St. Louis	6,778	7.6	6,650	8.6
Chicago & Erie	14,926	17.8	8,985	11.5
C., C., C. & St. Louis	3,601	4.5	5,224	6.7
Totals	79,362	100.0	77,704	100.0

Of the above shipments, 5,891 tons were flour, 48,712 tons grain and mill stuffs, 8,583 tons cured meats, 8,034 tons dressed beef, 1,653 tons butter, 1,200 tons hides, and 3,072 tons lumber.

Freight Traffic at St. Louis.

Certain statistics of the freight traffic to and from St. Louis for the year 1895, which have been gathered by the Secretary of the Merchants' Exchange, are published in the *Globe-Democrat*. From this statement we extract the following:

Freight across river, tons.	Eastward.	Westward.
By St. Louis Bridge	1,011,299	2,240,805
do. by wagon	343,141	686.282
By Merchants' Bridge	497,986	863,655
By Wiggins' Ferry	355,680	1,030,380
do. wagon	393,623	475,428
By Carondelet Ferry	184,280	273,332
By L. E. & St. L. R. R. Ferry	1,068	18,000
By Madison County Ferry	38,000	40,000
Total	2,825,077	5,627,882
Total, previous year	2,690,222	4,873,742

	1895.	1894.
Total receipts at St. Louis by all railroads, tons	10,489,344	9,512,910
Total shipments, do	5,349,327	4,780,256
Receipts by river	508,830	583,510
Shipments, river	303,355	363,080